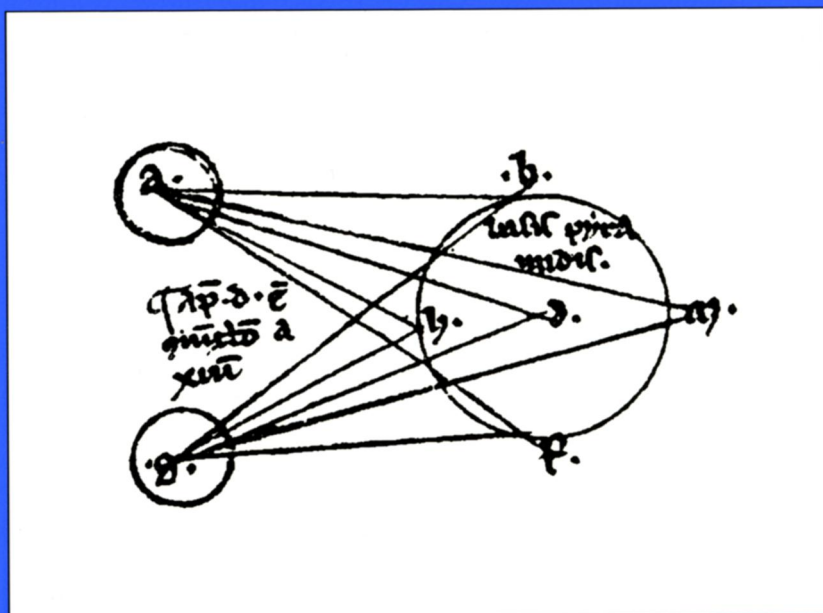


ALHACEN'S THEORY OF VISUAL PERCEPTION

A Critical Edition, with English Translation
and Commentary, of the First Three Books
of Alhacen's *De Aspectibus*, the Medieval
Latin Version of Ibn al-Haytham's
Kitāb al-Manāzīr

Volume One
Introduction and Latin Text



A. Mark Smith

Transactions
of the
American Philosophical Society
Held at Philadelphia
For Promoting Useful Knowledge
Volume 91 Parts 4 & 5

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VOLUME ONE
Introduction and Latin Text

VOLUME TWO
English Translation

A. Mark Smith

American Philosophical Society
Independence Square • Philadelphia
2001

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ISBN:0-87169-914-1

US ISSN:0065-9746

COVER ILLUSTRATION: Paris, Bibliothèque Nationale MS Lat 7319, f 114v. The author wishes to express his deep gratitude for permission to use the many figures from this manuscript that appear in this book.

Library of Congress Cataloging-in-Publication Data

Alhazen, 965-1039.

[Manazir. Book 1-3. English & Latin]

Alhacen's theory of visual perception: a critical edition, with English translation and commentary, of the first three books of Alhacen's *De aspectibus*, the medieval Latin version of Ibn al-Haytham's *Kitab al-Manazir*/[edited by] A. Mark Smith.

p. cm -- (Transactions of the American Philosophical Society; v. 91, pts. 4 & 5)

Includes bibliographical references (p.) and indexes.

Contents: v. 1. Introduction and Latin text -- v. 2. English translation.

ISBN 0-87169-914-1 (pbk.)

1. Optics--Early works to 1800. I. Smith, A. Mark. II. Title. III. Transactions of the American Philosophical Society; v. 91, pt. 4-5.

QC353

[.A32313 2001]

535'.09'021--dc21

2001041227

TRANSACTIONS

of the

American Philosophical Society

Held at Philadelphia for Promoting Useful Knowledge

VOLUME 91, Part 4

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VOLUME ONE

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PREFACE

Sometime between 1028 and 1038, Ibn al-Haytham completed his monumental optical synthesis, *Kitāb al-Manāẓir* ("Book of Optics"). By no later than 1200, and perhaps somewhat earlier, this treatise appeared in Latin under the title *De aspectibus*. In that form it was attributed to a certain "Alhacen."¹ These differences in title and authorial designation are emblematic of the profound differences between the two versions of the treatise. In many ways, in fact, they can be regarded not simply as different versions of the same work, but as different works in their own right. The underlying point of this observation is so obvious that it can all-too-easily pass unremarked and thus unheeded: translation is not a straightforward conversion-process. To translate, as its Latin form *interpretare* suggests, is to interpret. Accordingly, the Arab author, Ibn al-Haytham, and his Latin incarnation, Alhacen, represent two distinct, sometimes even conflicting, interpretive voices. The same holds for their respective texts.

To complicate matters, "Alhacen" does not even represent a single interpretive voice. As we shall see in due course, there were at least two translators at work on the Latin text, one of them (Gerard of Cremona?) hewing as faithfully as possible to the Arabic original, the other content with distilling, even paraphrasing, the Arabic original.² Consequently, the Latin text presents not one, but at least two faces to the reader. The Latin text is also markedly different from its Arabic source in organization. To start with, in lacking the first three chapters of book 1 of the *Kitāb al-Manāẓir*, the Latin text is missing almost half of that book in its original form. This turns out to be a significant omission in terms not only of amount, but also of content, for it is in those three chapters that Ibn al-Haytham sets forth key methodological principles for later discussion. Furthermore, the internal structure of the Latin text—according to chapters, subsections, and even paragraphs—is often at variance with that of the Arabic original.³ The analytic flow is therefore not precisely the same in the two texts, a fact that has a significant, albeit subtle, impact upon how the treatise is assimilated by the reader.

The two texts also differ according to lectorial perspective. The conceptual prism through which a medieval Arab scholar would have read the *Kitāb al-Manāẓir* is fundamentally different from that through which his scholastic Latin counterpart would have read the *De aspectibus*. To

be sure, Arab and Latin were separated by language, but they were separated at an even more profound level by conceptual and cultural differences, some reflected by, some reflecting upon, language. Thus, for instance, the Arabic term *sura* ("form") might have been taken in a relatively concrete sense as "similitude" or "image" by a medieval Arab reader, whereas its Latin rendering, *forma*, might well have been taken in a more abstract sense as "intentional species" by his scholastic Latin counterpart.⁴ Suffice it to say, examples of this sort abound.

All of this is to affirm that in many critical respects the Latin text can be, and indeed should be, analyzed on its own, wholly independent of the Arabic original. I emphasize this point to underline the fact that much of the analysis that follows in this book is slanted specifically toward Alhacen's *De aspectibus*, not Ibn al-Haytham's *Kitāb al-Manāẓir*. Much of what is said about the former no doubt extends to the latter, but such extension is often incidental rather than essential. Why restrict my analytic scope in this way? For one thing, I am not an Arabist. Any attempt on my part to speak for the Arabic text would thus be presumptuous. For another thing, even were I competent in Arabic, I doubt that I would have much, if anything, worth adding to what A. I. Sabra has already established in typically judicious fashion in his critical edition and English translation of the first three books of the *Kitāb al-Manāẓir*.⁵

At this point one might question the very need for a critical edition and translation of the Latin text when we already have Sabra's Arabic edition and translation. We have already addressed this issue—at least partially—by pointing to the fundamentally different interpretive faces the two texts present. The Latin text, in short, is not just a replica, in different linguistic guise, of the Arabic. The same holds for my English translation. As an *interpretatio* of an *interpretatio*, it stands entirely apart from Sabra's. My English translation is thus intended as a complement, not an alternative, to his.

There is yet another possible objection to this critical edition. A perfectly serviceable Latin text is already available in the form of Friedrich Risner's *editio princeps* of 1572, a landmark of lateer Renaissance scholarship that has since been reprinted.⁶ What point is there, then, in publishing an essentially redundant modern edition? This objection is blunted in at least three ways. First, Risner's edition is not at all "critical," at least not in the proper sense of the term. His primary goal in publishing the *De aspectibus* was to create an up-to-date version that would appeal to contemporary readers interested in optics. To that end he not only modified terminology and phraseology according to humanist standards, but also restructured the text by subdividing the origi-

nal narrative into theorematic chunks. Second, although Risner did provide annotation, primarily by interpolating sources and citations into the Latin text, his purpose in doing so was not to place the work into proper historical context. On the contrary, it was to modernize it out of proper historical context. Third, as we will later see, the two manuscripts from which Risner drew his edition fall within the least authentic of three basic family-traditions.⁷

Furthermore, with a critical Arabic text of books 1-3 of the *Kitāb al-Manāẓir* at last available, it is now possible to compare that text at every level against its Latin counterpart. But any comparison of Arabic and Latin texts on the basis of Risner's edition would be worse than useless; it would be downright misleading, because Risner transformed both terminology and phraseology in ways that do more to mask than to reveal proper textual links. In light of this consideration, the need for a new, critical edition of the *De aspectibus* is as obvious as is the insufficiency of Risner's text to fulfill it.

The need for such an edition gains added urgency from the fact that most of the key derivative works produced by Alhacen's Perspectivist disciples have come out in complete or partial form over the past three decades. The first to see print, John Pecham's *Perspectiva communis*, was published by David Lindberg in 1970.⁸ Since then Lindberg has produced editions of Roger Bacon's *De multiplicatione specierum* and *Perspectiva*.⁹ Meantime, critical editions of books 1-3 and 5 of Witelo's *Perspectiva* have appeared between 1977 and 1991, and an edition of book 4 is currently underway.¹⁰ Finally, at the divide between Perspectivist and modern optics, Johan Kepler's *Ad Vitellionem paralipomena* ("Emendations to Witelo") of 1604 has finally appeared in a critical English translation.¹¹ The time is thus ripe—indeed, overripe—for a critical edition of the work upon which all of these were ultimately based.

A final question that might be raised is why this edition is limited to the first three books of the *De aspectibus* rather than extending to all seven. There are two reasons. First, as I discuss later in the introduction (p. xviii), books 1-3 form a distinct and complete thematic unit. They therefore stand perfectly well on their own without any need of the remaining four books to provide context. The second reason has to do with the length of the *De aspectibus*, which runs to nearly 200,000 words. A proper edition of the remaining four books of the treatise, which can be subdivided into three thematic units, will be at least a decade in the making. I hope to have the next installment, a critical edition of books 4 and 5, ready for publication within the next three or four years.

This edition has been some fourteen years in the making. Over those years I have accrued a sizeable debt to individuals and institutions for their help and support. I therefore wish to take this opportunity to acknowledge those debts and express my gratitude to those who have allowed me to run them up. Let me start at the institutional level. First, and foremost, I wish to thank my home institution, the University of Missouri, for its generous support of this project, support that has come at both the Columbia campus level, through the MU Research Council (1987, 1990-91, 1993, and 1996), and the system level, through the University of Missouri Research Board (1995). I owe thanks, in addition, to the American Philosophical Society, the American Council of Learned Societies, and the National Endowment for the Humanities for their support during the summers of 1989 (APS, ACLS) and 1990 (NEH). Finally, I wish to express my deep gratitude to the National Science Foundation for supporting me during calendar year 1999, while I put the finishing touches on this edition and rendered it into publishable form.

Still at the institutional level, I am pleased to acknowledge the administration and staff of various libraries and manuscript-collections to whose holdings I needed continual access for this project. In particular, I owe a profound debt of gratitude to the staff of the following libraries for making me welcome at various reprises during the past twelve years. Foremost among these are the Trinity College Library, Cambridge; the Crawford Library of the Royal Observatory, Edinburgh (special thanks to Angus Macdonald for his kindness); the Wissenschaftliche Allgemeinbibliothek, Erfurt; the Royal College of Physicians, London; the Bibliothèque Nationale, Paris; and the Bibliothèque Municipale, St-Omer.

At the personal level, finally, I wish to thank the following: Matthew Shaw, not only for his invaluable editorial help, but also his yeoman labor in generating the Latin-English glossary and index; Melinda Lockwood, for her many services in formatting the text and rendering the diagrams importable into that text; Kristi Keuhn for her editorial contributions; Dallas Denery, Bruce Eastwood, David Lindberg, Robert Hatch, Norman Land, and Ann Stanton for their critical reading of various sections of this introduction. I would also like to thank the two referees, Noel Swerdlow and an anonymous reader, for providing me with several useful suggestions about both content and sources. Thanks, too, to Carole LeFaivre-Rochester, senior editor at the American Philosophical Society, for her encouragement and advice over the past year or so as this edition took final shape.

NOTES

¹For details on the dating and context of the *Kitāb al-Manāẓir*, see "Introduction," pp. xix-xxi below. Although it has been traditional to Latinize Ibn al-Haytham's name according to the form "Alhazen," the proper form according to the actual manuscripts is "Alhacen." For elaboration on this point, see "Introduction," p. xxi below.

²For further discussion of the two Latin translators/translations, see "Manuscripts and Editing," pp. clxviii-clxix below.

³The content and import of the first three chapters of the Arabic version are briefly discussed in "Introduction," p. xxiii below. For a more extensive discussion of the structural differences between Arabic and Latin texts, see "Introduction," pp. xxiii-xxiv below.

⁴For a close examination of the use and intent of "form" in the *Kitāb al-Manāẓir*, see A. I. Sabra, "Form in Ibn al-Haytham's Theory of Vision," *Zeitschrift für Geschichte der Arabisch-Islamischen Wissenschaften* 5 (1980): 115-140. For a discussion of the meaning and intent of "intentional species," see "Introduction," pp. lxxxviii-lxxxix below.

⁵For the critical Arabic text, see A. I. Sabra, *Ibn al-Haytham, Al-Manāẓir I-II-III = Kitāb al-Manāẓir. Books I-II-III: On Direct Vision* (Kuwait, 1983). For the English translation, which includes an extensive critical analysis of the treatise, see Sabra, *The Optics of Ibn al-Haytham: Books I-III on Direct Vision* (London: Warburg Institute, 1989).

⁶*Opticae thesaurus. Alhazeni arabis libri septem, nunc primum editi. Eiusdem liber De crepusculis et Nubium ascensionibus. Item Vitellonis thuringopoloni libri X* (Basel, 1572); reprinted with an introduction by David C. Lindberg (New York: Johnson Reprint, 1972). For a description of this edition, see "Introduction" and "Manuscripts and Editing," pp. xxii-xxiii and clx-clxi below.

⁷See "Manuscripts and Editing," pp. clxvi-clxix below, for details.

⁸David C. Lindberg, ed. and trans., *John Pecham and the Science of Optics* (Madison: University of Wisconsin Press, 1970).

⁹David C. Lindberg, ed. and trans., *Roger Bacon's Philosophy of Nature* (Oxford: Clarendon Press, 1983) and *Roger Bacon and the Origins of Perspectiva in the Middle Ages* (Oxford: Clarendon Press, 1996).

¹⁰Sabetai Unguru, ed. and trans., *Witelonis Perspectivae liber primus* (Wrocław: Ossolineum Press, 1977) and *Witelonis Perspectivae liber secundus et liber tertius* (Wrocław: Ossolineum Press, 1991). A. Mark

Smith, ed. and trans., *Witelonis Perspectivae liber quintus* (Wrocław: Ossolineum Press, 1983). Carl Kelso is currently editing book 4 for his doctoral dissertation at the University of Missouri.

¹¹William H. Donahue, trans., *Johannes Kepler, Optics: Paraliponema to Witelo and Optical Part of Astronomy* (Santa Fe, NM: Green Lion Press, 2000).

INTRODUCTION

1. *Ibn al-Haytham: A Biobibliographic Sketch*

The two cardinal sources for Ibn al-Haytham's biography are Jamāl al-Dīn ibn al-Qiftī (d. c. 1248) and Ibn Abī Usaybi'a (d. 1270), both of whom lived a good two centuries after Ibn al-Haytham. Most of what they have to say is therefore based upon secondary accounts and hearsay. Even so, by drawing upon the two biographers with care, we can piece together a fairly credible, if spotty, narrative of Ibn al-Haytham's career.¹ For instance, we are fairly certain that his birthplace was Baṣra on the Persian Gulf coastline of modern-day Iraq. According to one account, in fact, he eventually rose to the level of *vizier* there. We are less certain about Ibn al-Haytham's birthdate. One source allows us to pinpoint it to 965, but, despite its exactitude, this dating is suspect.²

Sometime around 1021, perhaps even earlier, he took up residence in Egypt. Why he did so is open to debate. One story has it that he came at the behest of the Fāṭimid Caliph, al-Ḥākim, who invited him to supervise a project for controlling the flow of the Nile, a project that Ibn al-Haytham had promoted for some time before al-Ḥākim extended his invitation. After surveying the Nile, the story continues, Ibn al-Haytham realized that the task was beyond his capacities. Fearing the wrath of his mercurial patron at his failure, he eventually pretended to be insane in the hope of escaping with his life.³ Confined to house-arrest until al-Ḥākim's death in 1021, he subsequently established residence at—or, more precisely, in front of—the Azhar mosque in Cairo. Occupying a tent there for the remainder of his life, Ibn al-Haytham led a spartan existence as a scholar, composing his own works, copying some for pay, and teaching.⁴

According to another account, by 'Alī ibn Zayd al-Bayhaqī, Ibn al-Haytham began to immerse himself in philosophical studies while serving as *vizier* in Baṣra. Realizing that his administrative obligations stood in the way of those studies, he feigned insanity in order to be relieved of his position. At that point he left Baṣra for Egypt in search of a more salubrious intellectual climate.⁵ Whichever the case, the eventual outcome was the same: sometime after 1021 Ibn al-Haytham fetched up at the Azhar mosque in Cairo, where he devoted himself to a life of the mind until his death some twenty years later.⁶

If the lists of his works drawn up by Ibn Abī Usaybi'a and Ibn al-Qiftī are to be credited, Ibn al-Haytham was extraordinarily prolific. Over 180 tracts are attributed to him by title, and he himself claims to have authored others that fell out of his possession and were irretrievably lost.⁷ Even more astonishing than the sheer number of these works is that most of them seem to have been composed in the relatively short interval between 1027 and his death, which probably occurred in 1041.⁸

The scope of his *oeuvre* is remarkably broad as well, ranging from pure mathematics and astronomy to medicine, logic, metaphysics, and even *kalām*, or speculative theology. Indeed, commentaries on the natural and epistemological (especially the logical) works of Aristotle figure prominently in the catalogue of his earlier works.⁹ Still, the primary focus of Ibn al-Haytham's writings, particularly those composed after 1028, was upon scientific and mathematical rather than philosophical matters. Among the scientific works specifically credited to Ibn al-Haytham, at least nineteen bear directly or indirectly upon optics.¹⁰ Only one of the four that can be dated with relative assurance to the period before mid-1028 has survived. Of the three that have not, one in particular stands out by the suggestiveness of its title: "A Book in Which I have Summarized the Science of Optics from the Two books of Euclid and Ptolemy, to Which I have Added the Notions of the First Discourse Which is Missing from Ptolemy's Book."¹¹ Of the two other lost works, one is entitled "Treatise on Burning Mirrors," the other "Treatise on the Nature of [the Organ of] Sight and on How Vision is Achieved through It." Suffice it to say, the recovery of these three lost works would be immensely helpful to us in reconstructing Ibn al-Haytham's early thought on light and vision.

The single work that does survive from this early period is entitled "Commentary and Summary of the *Almagest*." One of the issues addressed in this treatise is the apparent enlargement of the sun and moon toward the horizon, the so-called Moon Illusion, which Ptolemy broaches in chapter 3 of the first book of the *Almagest*.¹² Judging by the number of subsequent writings devoted wholly or in part to it, Ibn al-Haytham seems to have been preoccupied with this issue throughout the last decade or more of his life.¹³

The remaining works that deal with optical matters—fifteen in all—date from the period between mid-1028 and late 1038. Among these treatises (which include the *Kitāb al-Manāẓir*), thirteen are devoted exclusively to optical matters. The other two are concerned with optics only peripherally. Grouped according to subject-matter or approach, they are as follows:

Three works on the focusing properties of mirrors and spherical lenses:

1. "Treatise on Spherical Burning Mirrors."
2. "Treatise on Parabolic Burning Mirrors."
3. "Treatise on the Burning Sphere."¹⁴

Three works dealing with the problem of whether the light of the moon and other celestial bodies is intrinsic or extrinsic in origin:

4. "Treatise on the Light of the Moon."
5. "Treatise on the Light of the Stars."
6. "Treatise on the Nature of the Mark on the Face of the Moon."¹⁵

Three works that deal with optics in a more or less general way:

7. "Treatise on Optics According to Ptolemy's Method."
8. "Book of Optics" (*Kitāb al-Manāẓir*).
9. "Discourse on Light."¹⁶

Three works devoted to atmospheric refraction and its effect on celestial observation:

10. "Treatise on the Appearance of the Stars."
11. "Disputable Points in Ptolemy" (*Dubitaciones in Ptolemaeum*).
12. "Treatise on the Solution of Difficulties in the First Book of the *Almagest* which a Certain Scholar has Raised."¹⁷

Three works devoted to miscellaneous subjects involving ray-analysis:

13. "Treatise on the Rainbow and Halos."
14. "Treatise on the Quality of Shadows."
15. "Treatise on the Form of the Eclipse."¹⁸

Exactly where the *Kitāb al-Manāẓir* fits chronologically in this listing is difficult, if not impossible to determine with precision, but all indications are that it antedates entries 3, 6, 9, 11, 12, 14, and 15 above. Likewise, we can be fairly sure that it postdates the four works composed before 1027 as well as entry 10 above.¹⁹ We can thus assume with fair certainty that Ibn al-Haytham had been engaged in the study of optics

well before he undertook to write the *Kitāb al-Manāẓir*.²⁰ Nevertheless, our inability to determine the *Kitāb al-Manāẓir*'s chronological position more accurately leaves us far less certain than we would like to be about the development of Ibn al-Haytham's thought before he began composing this grand synthesis.

Unlike the rest of his surviving treatises on optics, which are rather narrowly focused, the *Kitāb al-Manāẓir* treats its subject in a truly comprehensive way. The first three of the seven books comprising this particular work are devoted to the problem of visual perception taken in its broadest sense. Book 1 lays the essential physical foundations for sight in terms of light- and color-radiation, the anatomical and physiological structure of the eye, and the various preconditions of sight: i.e., that the visible object be illuminated or luminous, that it face the observer, that the space between eye and object be transparent, etc. Book 2 explains how physical radiation is transformed into visual impressions by the optic complex between eye and brain. Among the specific topics addressed in this book are perceptual interpretation and perceptual certification. Book 3, finally, discusses the ways in which misperception can occur when the preconditions mentioned above exceed or fall short of certain limits: e.g., if an object is too bright or too dim, if it is too close or too far away, or if the intervening medium is inadequately transparent. Included in this account of visual illusions is an extensive analysis of binocular vision and diplopia. Altogether, then, the first three books of the *Kitāb al-Manāẓir* form a discrete topical segment.

The second topical segment of the *Kitāb al-Manāẓir* consists of books 4-6. Here Ibn al-Haytham deals with the visual effects of reflection, the analytic focus thus being upon mirrors and mirror-images. In order of analysis, book 4 lays out the basic principles of reflection, book 5 deals with image-formation in general, and book 6 takes up the issue of image-distortion according to the shape of the reflecting surface.²¹ Book 7 forms the third and final topical segment. In that book Ibn al-Haytham deals with the visual effects of refraction. The most signal of these effects are image-displacement and magnification, both of which bear upon the apparent positional displacement and enlargement of celestial bodies toward the horizon.²² At bottom, therefore, the *Kitāb al-Manāẓir* is organized according to whether and how the visual act is mediated, each topical segment addressing one of the three modes of sight: direct vision (unmediated), reflected vision (mediated by mirrors), and refracted vision (mediated by transparent bodies of different optical density).

As noteworthy as the *Kitāb al-Manāẓir* is for the topics it does cover, it is equally noteworthy for the two topics it does not. First, nowhere in the course of his analysis of reflection does Ibn al-Haytham discuss the

focal properties of parabolic or spherical concave mirrors: i.e., burning mirrors. As we have seen, these subjects were reserved for separate treatment.²³ The second topic not covered in the *Kitāb al-Manāẓir* is the rainbow and its formation. This, too, as we have seen, was reserved for separate treatment.²⁴ Thus, two subjects that would seem to be of paramount concern in optics are ignored completely in the *Kitāb al-Manāẓir*. However, as Sabra quite rightly points out, these subjects, particularly burning mirrors, were generally not included in the study of optics (or *manāẓir*), presumably because, unlike optics, these studies are concerned with light and its properties rather than with vision.²⁵

No summary can do justice to the meticulousness and depth of Ibn al-Haytham's analysis of sight and light in the *Kitāb al-Manāẓir*. Nor can a summary do justice to the lucidity of that analysis. Yet despite its obvious standing as a definitive source, the *Kitāb al-Manāẓir* seems to have suffered much the same fate as Ptolemy's *Optics* did some eight-and-a-half centuries earlier: it sank into oblivion almost as soon as it was completed.²⁶ Not until the late thirteenth century, some 250 years after its composition, did the *Kitāb al-Manāẓir* attract serious attention among Arab scholars. The key figure in resurrecting it was Kamāl al-Dīn al-Fārisī, whose *Tanqīḥ al-Manāẓir* ("Paraphrase of [Ibn al-Haytham's *Kitāb*] *al-Manāẓir*") provides both a synopsis of, and a commentary on, the *Kitāb al-Manāẓir* along with some of Ibn al-Haytham's shorter optical pieces. Kamāl al-Dīn's *Tanqīḥ* was thus instrumental in bringing Ibn al-Haytham's optical work to light and, on that basis, elevating Ibn al-Haytham himself to the high level of respect he still enjoys (and deservedly so) within the Arab world.²⁷

2. From *Kitāb al-Manāẓir* to *De aspectibus*

The Evolution of the Latin Text: Of all the works ascribed by title to Ibn al-Haytham, some sixty have survived in Arabic according to Sabra's count.²⁸ Of those sixty, only three have come down to us in Latin. By far the most significant of these three is the *Kitāb al-Manāẓir*. Of the other two, only one deals with optical matters: the "Treatise on Parabolic Burning Mirrors" (entry 2, p. xvii above), which circulated in Latin as the *De speculis comburentibus seu de sectione mukefi* ("On Burning Mirrors or On the Parabolic Section").²⁹ The third and final work rendered into Latin is a relatively brief treatise on cosmology entitled "On the Configuration of the World," which bears the Latin title *De configuratione mundi*.³⁰

Precisely when and by whom the *Kitāb al-Manāẓir* was translated

into Latin is very much at issue. The traditional dating—late twelfth century—depends in great part upon the unfounded, or at least poorly founded, assumption that Gerard of Cremona served as translator. As far as concrete evidence is concerned, there is nothing yet discovered to indicate that the *De aspectibus* was in circulation before the 1220s or 1230s.³¹ The earliest incontestable evidence of its circulation is to be found in Bartholomeus Anglicus' *De proprietatibus rerum*, where the *De aspectibus* is cited several times. This work probably dates to the later 1240s.³² It was not until the 1260s, however, that the *De aspectibus* began to circulate in earnest, its increasing popularity reflected in such key derivative works as Roger Bacon's *Perspectiva* (c. 1265), Witelo's *Perspectiva* (c. 1275), and John Pecham's *Perspectiva communis* (c. 1280).³³ By the mid-fourteenth century, it had become enough of a staple to have been translated into Italian.³⁴

No less indeterminate than the date of the translation is its source. Although the *De aspectibus* is commonly ascribed to Gerard of Cremona, that ascription is problematic in several ways. For one thing, the *De aspectibus* is not included in the standard list of Gerard's translations.³⁵ It is difficult to understand how a work of such monumental significance and size could have been overlooked when that list was compiled by Gerard's students. For another thing, Gerard is linked with the *De aspectibus* through a brief treatise entitled *De crepusculis et nubium ascensionibus* that is appended to the *De aspectibus* in several manuscripts.³⁶ So placed, it was taken to be an integral part of the *De aspectibus* during the later Middle Ages and Renaissance. Accordingly, Pedro Nuñez, who first published the *De crepusculis* in 1542, attributed it to Alhacen. So did Friedrich Risner, who included the *De crepusculis* in his edition of the *De aspectibus*. Like Nuñez before him, moreover, Risner cited Gerard of Cremona as translator.³⁷ As it turns out, Nuñez and Risner were only half right: Gerard of Cremona probably did translate the *De crepusculis*, but Alhacen was definitely not its author.³⁸ That distinction falls to Ibn Mu'ādh al-Jayyānī, a late-eleventh-century Muslim scholar from Jaén in southern Spain.³⁹ Hence, Gerard's association with the *De aspectibus* is based, at least in part, upon a spurious link between the *De aspectibus* and the *De crepusculis*.

A further problem with identifying Gerard of Cremona as translator is that at least two translators (or translation-styles) appear to have been at work in the *De aspectibus*. Up to the third chapter of book 3, the Latin text is remarkably faithful to the Arabic original. At that point, however, the two texts part company, the Latin translation degenerating into a rather inept distillation of the Arabic original.⁴⁰ In terms of translation-style, then, books 1-3 of the Latin text consist of two distinct

sections. The first runs from the beginning of the first book to the middle of chapter 3 of the third book, the second from the middle of chapter 3 of the third book to the end of the book.⁴¹ Clearly, then, if Gerard of Cremona did have a role in translating the *Kitāb al-Manāẓir*, it was a shared one.

Although the issue of when and by whom the *Kitāb al-Manāẓir* was rendered into Latin remains unresolved, two other longstanding issues can be quite easily put to rest. The first has to do with the proper title of the Latin version. Lindberg, and Sabra following him, suggests that “De aspectibus” and “Perspectiva” are legitimate alternatives.⁴² But a close examination of the manuscripts reveals this suggestion to be misleading. There is absolutely no doubt that the proper title of the treatise—the one actually chosen by the translator(s)—is “De aspectibus.”⁴³ I am in fact aware of only four cases in which the term “Perspectiva” occurs in the manuscripts. In two instances it is indeed used as a titular designation, but in both cases it constitutes a later interpolation, not an integral part of the original text. In the remaining two instances the term is not intended as a titular designation at all.⁴⁴

The second issue involves the correct Latin form of Ibn al-Haytham’s name. Until quite recently, “Alhazen” was the unanimous choice among scholars. There is, however, no support whatever within the manuscript-tradition for that choice. The only forms to be found in the manuscripts themselves are “Hacen,” “Alacen,” “Achen,” and “Alhacen,” this last being the most common. “Alhacen,” moreover, is an appropriate Latin transliteration of “al-Ḥaṣan,” Ibn al-Haytham’s given name.⁴⁵ The form “Alhazen,” on the other hand, seems to have originated with Friedrich Risner, and its persistence since the publication of the *Opticae thesaurus* is a testament to the speed and force with which that work swept the field of optics after its appearance in 1572.⁴⁶

The pattern according to which the *De aspectibus* was disseminated during the three centuries or so after its initial appearance is probably reflected, however dimly, in the chronological and geographical distribution of the twenty-two surviving manuscripts or manuscript-fragments of the work. Nine date to the thirteenth century, nine to the fourteenth, two to the fifteenth, and two to the sixteenth.⁴⁷ These figures suggest fairly strongly that the *De aspectibus* saw its widest dissemination in manuscript form during the thirteenth and fourteenth centuries—i.e., between roughly 1250 and 1400. After that, most of the momentum for “publication” seems to have been lost until the printing of Risner’s edition in 1572. A probable factor in this loss of momentum is the parallel dissemination of various derivative works, particularly John Pecham’s *Perspectiva communis*.⁴⁸

As to geographical distribution, copies of the *De aspectibus* are currently to be found in fourteen locations scattered throughout "Latin" Europe. Listed in alphabetical order, they are as follows: Bruges (1 complete); Cambridge (2 complete or almost complete); Cracow (1 fragment); Edinburgh (1 complete); Erfurt (1 complete, 1 fragment); Florence (1 almost complete); London (3 complete or almost complete); Milan (1 fragment); Munich (1 complete); Oxford (1 complete); Paris (3 complete); Rome (1 fragment, 2 complete, including the fourteenth-century Italian translation); St-Omer (1 complete); Vienna (1 complete, 1 fragment).

To be sure, these chronological and geographical data are indicative at best, certainly not definitive. For a start, the survival of ancient artifacts, manuscripts included, is a chancy business. The relative dearth of manuscripts from the fifteenth and sixteenth centuries may thus reflect nothing more than the vagaries of time. Or, as has already been suggested, it may be the result of saturation. Likewise, for several of the manuscripts, current provenance reflects the whim of modern collectors or antiquarians rather than the actual working life of those manuscripts. This is certainly the case with such agglomerated holdings as those currently in the Bibliothèque Nationale in Paris or the Bayerische Staatsbibliothek in Munich. Still, we can conclude with moderate assurance that the *De aspectibus* enjoyed its broadest diffusion in manuscript-form, both chronologically and geographically, during the period from roughly 1250 to 1400. The period after 1400 seems to mark a settling-in of sorts, the supply of manuscripts having more or less matched demand.

Still, there must have been considerable pent-up demand by the second half of the sixteenth century, for by far the broadest dissemination of Alhacen's treatise came after 1572, when the *De aspectibus* saw print for the first time in Friedrich Risner's *Opticae thesaurus*. Virtually as soon as it appeared, this edition superseded everything that went before it. The reasons are not far to seek. First, Risner's text is much easier to read and use than any of the manuscript-sources; not only is the type-face distinct and easily deciphered, but Risner kept abbreviations to a minimum in order, presumably, to reduce the possibility of ambiguous readings. In addition, by breaking the text into propositions, adding enunciations, providing cross-references, and giving source-citations not in the original, Risner made the text as a whole much more accessible as a research-tool. As with the text, so with the diagrams, Risner made significant clarifications and improvements, thus easing the reader's burden, particularly after book 3, when the analysis becomes increasingly technical.

As to the genesis of Risner's edition, we are fortunate to have a brief background account in the dedicatory preface he composed for Catherine de Medici, queen mother of Charles IX of France. It was at the urging of Petrus Ramus (or Pierre de la Ramée), Risner informs us, that he undertook to edit the treatise, using two manuscripts (one supplied by Ramus after a long search through libraries and among booksellers) as the basis.⁴⁹ Which two, if any, among those currently at hand is open to question and may well remain so forever, given the substantial editorial changes and additions that Risner imported into the original text. But we can at least narrow the possibilities to a particular subfamily—one of three—within the overall manuscript-tradition.⁵⁰ Consisting of six manuscripts, this subfamily is firmly linked to Risner's text through a number of distinctive common features, such as the inclusion of Ibn Mu'ādh's *De crepusculis*, the repetition of glosses, and the sharing of a significant number of detailed textual variants.⁵¹ Risner's text therefore represents the last and most divergent member in a subfamily of manuscripts that itself turns out to be most divergent from the *Urtext*. There is more than a little irony in this fact. For, in doing his best to improve the Latin text, Risner went farther than anyone before him toward corrupting it. More to the point, it is upon this corrupted version of the *De aspectibus* that most modern scholarship has been based.

A Structural Comparison of Texts: By far the most significant structural difference between the Arabic and Latin texts is found in book 1, where the first three of eight chapters in the Arabic original are missing in the *De aspectibus*. In terms not only of size, but also of content, this omission is as remarkable as it is unfortunate, because the three chapters in question constitute nearly half the first book in Arabic.⁵² The Latin version of book 1 is therefore badly truncated, opening with chapter 4 rather than chapter 1 of the Arabic original.

As it stands in the Latin text, moreover, the fourth chapter of the Arabic original (i.e., the opening chapter of the Latin version) is sectioned arbitrarily into three, four, or even five subchapters in various manuscripts. As a result, the first book in the Latin text comprises as few as seven and as many as ten chapters, depending upon which manuscripts are taken into account.⁵³ This is more than a little puzzling. Why subdivide the first chapter at all? The most obvious explanation is that the translator(s) sectioned the first chapter in such a way as to bring the total number of chapters in book 1 of the Latin version into line with the total number of chapters in book 1 of the Arabic original. Yet there is no overt indication in any of the Latin manuscripts that the translator(s) was aware that his text (or his Arabic exemplar) was deficient in any

respect whatever.⁵⁴ Furthermore, the canonical number of chapters for book 1 in the original Latin version, as established in the critical text that follows, differs from the canonical number of chapters in the Arabic original—i.e., nine as opposed to eight.⁵⁵ To confuse things even further, several of the manuscripts disagree about the specific placement of chapter-heads, creating breaks where none by rights belong according to the Arabic original.⁵⁶

Similar structural anomalies can be found in the other books as well. Several of the manuscripts subdivide book 2 into five rather than the four canonical chapters of the Arabic version. Chapter 3 of that second book is further broken into subsections in a number of different ways, depending upon which manuscripts are examined.⁵⁷ In the third book, on the other hand, the pattern of seven chapters set by the Arabic original is followed in most of the manuscripts, although six of them have two versions of chapter 3. As we shall show later on, this anomaly is of particular significance for our understanding of the generation and dissemination of the Latin text. Like chapter 2 of the second book, chapter 7 of the third book is subsectioned in several different ways among the manuscripts.⁵⁸ So it is with the remaining books; the way they are subdivided into chapters varies among the manuscripts, sometimes to a significant extent.⁵⁹ With no critical Arabic text against which to compare them, however, there is no way of determining which manuscripts conform to the Arabic original and which do not.

As in the gross structure of the treatise, so in its finer structure, there are significant differences between Arabic and Latin texts over the course of books 1-3. Aside from the occasional omission of a paragraph in the first two books, the most salient of these differences is to be found in the text that follows chapter 3 of the third book, a portion that consists of four chapters. In the Arabic version, this swath of text constitutes nearly eighty percent of book 3. In the Latin version, it has been reduced to fifty percent. This means that chapters 4-7 of book 3 in the Latin version have been distilled to just over twenty-five percent of their counterpart in the Arabic version.⁶⁰

As far as format is concerned, then, the Latin text is far from a duplicate of the Arabic original. In some case, the differences in format are so acute as to be obvious at first glance. In others, they are somewhat more subtle. Cumulatively, however, they change the textual framework of the Latin version in significant ways that add to the interpretive distance between Latin and Arabic texts.

3. *Ibn al-Haytham's Core Sources*

The Problem of Sources: In typical fashion for his day, Alhacen felt no obligation to cite sources by name. Accordingly, in those rare instances when references do crop up in the *Kitāb al-Manāẓir*, they are generic, designating groups rather than individuals. Context allows us to be somewhat more specific, though. For instance, by “mathematicians” and “those who posit rays” (*mathematici* and *ponentes radios*) Alhacen doubtless means those scholars who follow Euclid and Ptolemy in supporting the visual-ray theory of sight. By “natural philosophers” (*naturales*), on the other hand, he seems to designate those scholars who rely upon Aristotle for their analytic principles. Finally, in mentioning “anatomists” (*anathomici*) and practitioners of “the medical art” (*ars medicinalis*), Ibn al-Haytham presumably has in mind those scholars who follow the anatomical and physiological lead of Galen.⁶¹

That Euclid, Ptolemy, Aristotle, and Galen were known to Ibn al-Haytham not just mediately, through their later proponents, but immediately, through their actual writings, is evident from Ibn Abi Usaybi'a's catalogue. We have already noted among the listed tracts one that makes explicit reference to Euclid's and Ptolemy's *Optics*: “A Book in Which I have Summarized the Science of Optics from the Two books of Euclid and Ptolemy, to Which I have Added the Notions of the First Discourse Which is Missing from Ptolemy's Book.” Although the treatise itself is lost, its title suggests far more than passing familiarity with the two optical sources cited. This suggestion is borne out by the two other works (listed as entries 7 and 11, p. xvii above) that deal explicitly with Ptolemaic optics. So too with Galen, there is clear evidence that Ibn al-Haytham had mastered several relevant works, foremost among them the *De usu partium*, the *De placitis Hippocratis et Platonis*, and *On Diseases of the Eye*.⁶² As for Aristotle, finally, we have good reason to suppose that Ibn al-Haytham paraphrased several of his works in the relatively early phase of his scholarship. Especially important in this regard would have been the *De anima*.⁶³

It is one thing to isolate the specific sources used by Ibn al-Haytham and quite another to understand how he actually used them. To do that, we must take the following three points into account. First, Ibn al-Haytham viewed his sources ahistorically, not as marking stages in a line of development but as offering parallel, often complementary, accounts. As a result, he managed to discern some level of “truth” in each of them without being diverted by the fundamental conflicts among them.⁶⁴ Second, taken as a whole, those sources provide an interpretive context within which Ibn al-Haytham would have read and construed

each one individually. Thus, for example, his reading of Ptolemy had to have been colored by his understanding of Aristotle and Galen. Finally, there is a larger interpretive context, or tradition, within which Ibn al-Haytham worked, a tradition that coalesced around these particular sources. Based primarily upon derivative works, particularly commentaries, this larger interpretive tradition manifested a strong tendency toward textual reconciliation and integration.⁶⁵ As we shall see, Ibn al-Haytham's *Kitāb al-Manāẓir* reflects this tendency in several critical ways.

In light of these three points, let us take a brief look at the key formative sources for Ibn al-Haytham's theory of vision. We will start with a brief examination of Aristotle's account of vision as he analyzes its progression from initial physical cause to final perceptual effect. We will then do the same for the Euclidean-Ptolemaic account, after which we will turn to Galen, placing special emphasis upon his anatomical and physiological model of the eye and brain. We will conclude in the next section (i.e., section 4) by following the course of these three accounts as they were taken up, elaborated upon, and to some extent integrated, by such early-medieval Arab scholars as Ḥunayn ibn Ishāq and Yaq'ūb al-Kindī.

Aristotle's Theory of Visual Perception: The two principal sources for Aristotle's ideas about visual perception are the *De sensu et sensato* and the *De anima*. In both of these works the focus is not so much upon vision as upon sensation in general. Nonetheless, from the two of them we can develop a fairly coherent account of sight. According to that account, the initial cause, or "proper object," of vision is color. Being an inherent property of physical bodies, color is therefore what renders them potentially visible.⁶⁶ To become actually visible, those bodies must occupy a continuous transparent medium, such as air, that links them directly with the eye. Yet, without light such media are only potentially transparent. In order to become effectively transparent they must be illuminated. Light therefore plays the role of catalyst in the visual act: not itself visible, it is nonetheless crucial to that act, for without light the media through which color manifests itself would remain perfectly black and opaque.⁶⁷

As soon as their potential transparency is actualized by light, such media as air or water are apt, by their very nature, to assimilate color. They do so in an incidental way that leaves them essentially unaltered. The "coloring" of transparent media, in short, is qualitative or formal, not material. In that respect it is wholly unlike the tinting of water by dye or the coloring of a wall with pigment. Diffused instantaneously through the continuous medium, the visible color-effect reaches the eye,

then passes into and through it in a process of continuous replication.⁶⁸ The eye, for its part, has a dual nature. As a material entity, on the one hand, it is physically tinged by the impinging color—hence, the reflection of images in the smooth, corneal surface. As a sentient entity, on the other, it assimilates the physical color-effect in a visual way, transforming it into a sense-impression, much as soft wax takes on the impression of a seal without being thereby altered in its essential nature.⁶⁹

From the eye, this visual color-impression is passed inward to a generalized faculty that is able to assimilate not only it, but all the attendant impressions, such as touch, taste, and smell, that are passed to it by the individual senses. Called the “common sensibility” (*aisthesis koinē*), this faculty has two basic functions, the first of which is to combine various sense-data into a single sense-representation of the given object. Its other basic function is to abstract the so-called common sensibles from the primal sense-impressions. Comprising the spatial attributes of things (e.g., motion, rest, magnitude, shape), these sensibles are “common” insofar as they can be apprehended by more than one sense.⁷⁰ Thus, for example, shape can be both seen and felt, as can magnitude, or even motion.

The sensible “image” abstracted by the common sensibility is passed on, in turn, to the imagination (*phantasia*), where it serves as a perceptible representation of its generating object. As such, it conveys not only the full range of sensible properties belonging to the original object, but also a range of characteristics that transcend sensibility. These characteristics, which Aristotle dubs “incidental sensibles,” are implicit rather than explicit in the sensible representation. As an example Aristotle cites the realization that “the white object which we see is the son of Diaretes.” Since “being the son of Diaretes is incidental to the white which is perceived,” Aristotle explains, “we speak of the son of Diaretes as being incidentally perceived [because] it in no way as such affects the senses.”⁷¹ In other words, incidental sensibles are neither sensible nor perceptible in a strict sense. They are the product of interpretation or inference, conceptual representations abstracted by the reasoning faculty (*logistikon*) from the perceptible representations occupying the imagination.⁷² Presumably, then, our conceptual (or intellectual) apprehension of external reality is based on such incidental sensibles.

Four points in particular stand out in Aristotle’s account of sight. First, according to that account, the act of seeing is unequivocally intromittive: the cause-and-effect sequence flows inward, from external object to the eye and thence into the soul. The eye is therefore essentially receptive, not active, in the process of visual apprehension. Second, the ulterior cause of vision is color. In other words, color is all that

is ever really seen. Third, the underlying physical cause of sight is formal rather than material. Sight is therefore not due to an influx or efflux of matter. Fourth, taken in its broadest sense, seeing unfolds in four stages: (1) the physical impression of color in the eye, (2) brute sensation, during which the sense-impression of color arises from the physical impression made upon it, (3) perception, during which a composite sensible impression is abstracted from sense-impressions by the common sensibility and presented to the imagination, and (4) apperception, during which conceptual impressions are abstracted from perceptual impressions by the reasoning faculty. For Aristotle, therefore, sight is neither simple nor intuitive; it requires a considerable amount of psychological and intellectual mediation.

The Visual-Ray Theory: Euclid was by no means the first to apply ray-analysis to optics, but, as far as we know, he was the first to develop a systematic theory of vision on its basis.⁷³ Articulated in his *Optics* (c. 300 B.C.), this theory is grounded in the premise that the eye sees by reaching out to visible objects. This it accomplishes by emitting visual flux along discrete radial lines. These radial lines bundle together to form a cone with its vertex at the common origin-point for the flux. Lying within the eye at an unspecified location, this vertex-point also defines the center of sight. The cone's base, on the other hand, defines the field of vision. Whatever lies within that field is seen by the rays that make physical contact with it, so vision is reduced to a form of touch in Euclid's account.⁷⁴

As an analytic device, the visual cone is especially effective in explaining how we see things spatially—in short, how we perceive the Aristotelian common sensibles. Shape is revealed when visual rays “feel” an object's surface and thereby get a sense of its defining form. Position is visually determined according to the relative upwardness, downwardness, leftwardness, or rightwardness of the sensing rays.⁷⁵ Size is apprehended according to the extent of the visual angle subtended by the object: the greater that angle, the larger the object will appear.⁷⁶ Lateral motion is sensed by the tactile ends of the visual rays as objects sweep through them. When no such sweep is detected, the object will be perceived to be at rest.⁷⁷

In addition, variations in visual acuity according to distance can readily be explained on the basis of Euclid's visual-ray model. A given object is seen more clearly at a closer distance because its surface is touched by more rays, or, to put it somewhat more accurately, by a more densely-packed sheaf of rays. The farther away it gets, the fewer rays make contact with it until, finally, it falls into the inter-radial gaps. At

that point the object disappears entirely from sight.⁷⁸

The deficiencies of this account are as evident as they are manifold. For one thing, Euclid's analysis is much too limited in scope. All it can effectively address are the palpable features of things. Color-perception is never broached, nor, for that matter, is light and its role in the visual process. Perception of abstract qualities—i.e., the Aristotelian incidental sensibles—is completely ignored as well. How do we see beyond the physical shell of things to their inner, defining forms ("that white thing before me is Diares' son")? Under what conditions is vision veridical ("that white thing before me is indeed Diares' son, not Socrates")? Why and how do we misperceive things ("that bright white body looks larger than the identical black body beside it")? These sorts of issues are passed by entirely in Euclid's *Optics*. Likewise, binocular vision is all but ignored. And so is the variation of perceptual acuity within the visual cone itself according to relative distance from the visual axis.⁷⁹

Even within its own analytic limits, the Euclidean account is problematic. Take Euclid's explanation for why objects eventually disappear from sight as they get farther away. If that happens because the objects fall within inter-radial gaps, then surely those objects ought to appear and disappear by turns as we visually scan the region they occupy. Size-perception is a problem too. If we judge size by visual angle alone, as Euclid does, then tiny objects seen up close should be perceived as larger than massive objects seen from afar. Accordingly, when we place our hand before our face in such a way that it blocks our view of a distant mountain, we ought to perceive our hand as larger than the mountain. This in fact does not happen. Even though our hand may subtend a larger visual angle than the mountain beyond it, we realize that it is much smaller, and we perceive it that way.

These are not trivial issues. Indeed, they had to be addressed squarely if the visual-ray theory was to succeed as an effective explanatory model. Ptolemy's *Optics* can best be understood as a response to this imperative. Ptolemy agrees with Euclid that the eye emits visual flux in the form of a cone, although, unlike Euclid, he is explicit in locating the cone's vertex at the center of the eyeball. The eyeball itself is now taken to be a true sphere, at least in its frontal portion. Unlike Euclid, as well, Ptolemy supposes that the visual cone is not a bundle of discrete radial lines but an actual continuum.⁸⁰ The visual ray is therefore no longer real but imaginary, a conceptual device that permits us to analyze the world of appearances mathematically.

Since Ptolemy assumes the visual flux to be perfectly continuous, he cannot, as does Euclid, explain variations in visual acuity on the basis of

individual rays and their separation. Instead, he appeals to a dynamic model according to which visual acuity is a function of the sensitive power of the flux. The more intense that power, the more intense the visual impression it yields. Most intense when the flux is near its origin at the eye's center, this power diminishes continuously as the flux recedes from that point. Thus, as Ptolemy sums it up,

... powers that approach their generating sources are more effective. The farther such powers extend from their sources, then, the weaker they become—as, e.g., [the power of] projection [in relation to] the thrower, or of heat in relation to the heater, or of illumination in relation to the light-source.⁸¹

Conversely,

... among objects whose appearance depends upon the quality of [radiative] effects, those that lie directly in front of, and at right angles to the rays are seen more clearly than those that do not. For everything that falls orthogonally strikes its subjects more intensely than whatever falls obliquely.⁸²

According to Ptolemy, then, the closer an object is (within limits) to the center of the eye, where the flux originates, and the more direct the impingement of that flux on the object, the more clearly it will be seen.

Finally, to explain why acuity is optimal along the visual axis, Ptolemy relates the flux's sensitive power to its lateral distance from the center of the visual field within the frontal plane :

And since [each] visual ray terminates at its own unique point, what is seen by the central ray—i.e., the one that lies upon the axis [of the visual cone]—should be seen more clearly than what is viewed to the sides [of the visual axis] by lateral rays. The reason is that those rays lie nearer to [the edge of the visual cone where there is an increasing] absence [of rays], whereas those rays that approach the [visual axis] lie farther from [such an area of] absence.⁸³

Implicit in this dynamic account of visual acuity is a model of radiation based upon projectile motion. Accordingly, the visual flux is treated as a composite of tiny bodies hurled at great speed in all directions and along radial trajectories from a single point. In theory, then, the flux should propagate overall in the form of a sphere, although it is presumably channeled by the pupil into a cone. As we shall see later on, this

radiative model was crucial to Alhacen's account of image-selection in the visual process.

On its own, visual flux is insufficient to cause sight, even when it encounters external objects. Two other preconditions must be met. For a start, "objects that are subject to vision must somehow be luminous, either in and of themselves or from elsewhere, since that is essential to [the functioning of] the visual sense." Furthermore, Ptolemy continues,

visible objects must . . . be compact in substance in order to impede the visual flux, so that its power may enter into them rather than pass through without incident effect. Thus, it is impossible for anything to be seen without these two conditions' being met, nor [can anything be seen] when one of them is met without the other.⁸⁴

According to Ptolemy, then, luminosity and compactness—i.e., opacity—render objects sensible to the visual flux.

But luminosity and compactness are not themselves actually visible; they simply form the grounds of visibility. Strictly speaking, the only thing that *is* visible for Ptolemy is color. Even what we see as "light" is not light *per se* but, rather, the dazzlingly bright color of the luminous source.⁸⁵ To put it in Aristotelian terms, color, for Ptolemy, is the proper object of sight, the sole property of things that can be apprehended by the visual flux. The apprehension itself takes form as a "passion" (*passio*), or feeling, through which the flux undergoes "coloring" (*coloratio*). Arising at the object's surface, the resulting color-effect is transmitted back through the visual flux to the eye, where it makes a visual impression.⁸⁶ This color-impression is absolutely primal; from it everything else that is seen derives. Color thus constitutes the primary visible (*primo videtur*) in Ptolemy's account. Everything else that is seen is secondarily visible (*sequenter videntur*) because it is apprehended on the basis of color alone.⁸⁷ Color, in short, is immediately visible; all other qualities that are subject to visual perception are mediately visible.

As for Aristotle, so for Ptolemy, color is an inherent, objective property of physical bodies, not a mere subjective effect arising from physical (i.e., material and quasi-mechanistic) interactions between ourselves and external particulars.⁸⁸ Occupying the surfaces of bodies, moreover, color defines them for sight by providing the boundary-conditions under which they are visually grasped as discrete wholes. Hence, it is through color that we are able to perceive the spatial features of external objects as well as to locate them relative to all other objects in space.⁸⁹

Like Euclid, Ptolemy places the burden for explaining spatial perception squarely upon the visual cone. For instance, he follows Euclid

in granting directional privilege to individual rays within the cone so that they can sense where things lie within the visual field (i.e., up, down, left, right). He follows Euclid, as well, in looking to the visual angle as a key determinant of size-perception. Unlike Euclid, however, he endows the perceiver with an innate sense of ray-length so that he can gauge distances more or less intuitively—at least within moderate limits.⁹⁰

This ability to gauge distances plays a crucial part in most spatial perceptions. For instance, the perception of obliquity is clearly dependent on it. As figure 1 illustrates, when rays **EA** and **EC** that flank the axial ray **EB** at equal distances are perceived as equal in length, the surface **AC** that they sense will be perceived as perfectly frontal. On the other hand, when flanking rays **ED** and **EF** are perceived as unequal in length, surface **DBF** will be adjudged oblique.

Perception of distance and obliquity is crucial, in turn, to size-per-

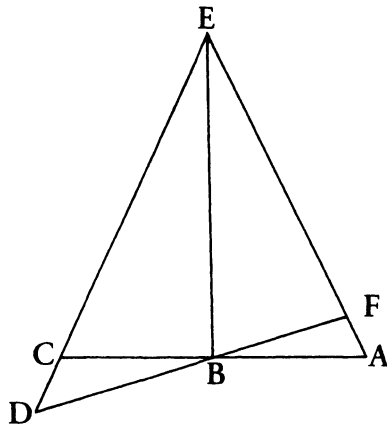


figure 1

ception. Thus, if two objects subtend the same visual angle but one of them is judged to lie farther away, the farther object will appear larger. Likewise, if two objects subtend the same visual angle, but one of them is adjudged to be more oblique than the other, the one that is more oblique will appear larger.⁹¹ Being able to perceive obliquity is critical to shape-perception. Hence, when we perceive a circle at a slant, we still perceive it to be circular rather than elliptical.⁹²

Distance- and size-perception can also be determined in extrametrical ways. For instance, if two neighboring bodies of significantly different brightness are seen under equal visual angles, and if their distances are indeterminate, the dimmer body will be judged to lie farther away because it appears less distinct. This, Ptolemy concludes, is why

"mural painters use weak and tenuous colors to render things that they want to represent as distant."⁹³ Furthermore, being perceived to lie farther away, the dimmer body will also appear larger, since size-perception depends upon both perceived distance and visual angle.

Although it, too, is subject to geometrical analysis, shape-perception can also be based upon color-contrasts. Take convexity or concavity, for example. One way of perceiving them is through a "feeling" aroused in the visual flux, "just as [they] are perceived by touch, convex[ity] being apprehended through the concavity of the encircling hand, and concav[ity] being apprehended through the convexity of the encircled hand."⁹⁴ But the same perceptual effect can be created by an artist who "paints the part he wants to appear higher a bright color, whereas the part he wants to appear concave he paints with a weaker and darker color."⁹⁵ It is therefore through such color-effects that painters convey the illusion of spatial reality in their representations of it. In short, these color-effects cause us to misperceive what we see. Obviously, there is no actual difference in distance between the bodies represented in the mural, even though we may perceive there to be. Nor is the spatial depth implied in the painted representation of concavity really *in* the painting, since that painting is rendered on a flat surface.

Such misperceptions arise when the object that is seen cannot be properly viewed because the circumstances under which it is seen are abnormal. In the case of artistic illusionism, the illusion is successful only as long as we are far enough away from the painting to be unable to detect that it actually is an illusion. In other cases, the misperception is due to some impediment that prevents a proper view. Diplopia, or double vision, is a clear example. Under normal circumstances, Ptolemy explains, we see objects as single because both of our eyes work naturally in concert to produce a single image from the separate images apprehended by each eye.⁹⁶ They do so by focusing their respective visual axes at a single point upon whatever is being scrutinized. That way the bases of the two visual cones overlap perfectly. Thus sharing the same visual field, both eyes see precisely the same thing. Diplopia, on the other hand, occurs when the two visual axes are prevented from meeting on the object. In that case, the two bases do not overlap perfectly, so the two eyes do not see precisely the same thing. The result is a double image.⁹⁷ The more imperfect the overlap of visual fields, the greater the displacement of the two images.

The degree of displacement is geometrically determined according to what Ptolemy calls the common axis, which extends from "where the vertices of the visual cones ought to intersect" to the point at which the two visual axes intersect, as is illustrated in figure 2, where A and C

represent the centers of the two eyes whose respective axes, **AB** and **CB** intersect at point **B** on the surface of object **DE**. Thus, the two visual cones, **ADE** and **CDE**, share the same base, and the object appears single. Meantime, if edges **DA** and **EC** of the visual cones are extended to **F**, then **FB** will be the common axis.

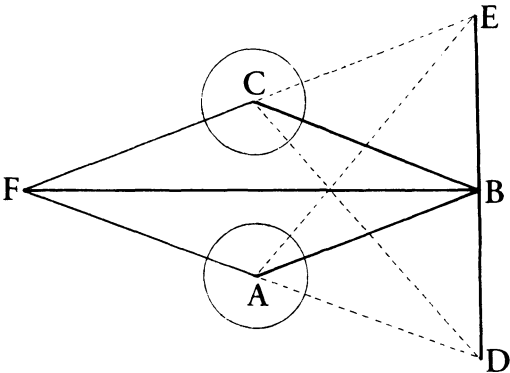


figure 2

When all three axes meet at a single point on the object-surface being viewed, image-fusion will be perfect. Otherwise, diplopia will result, the amount of relative displacement being contingent upon how far beyond or in front of the object under scrutiny the three axes join. Thus, if **A** in figure 3 (adapted from Ptolemy, *Optics*, II, 48-54) represents the center of sight with visual axis **AB** intersecting common axis **GB**,

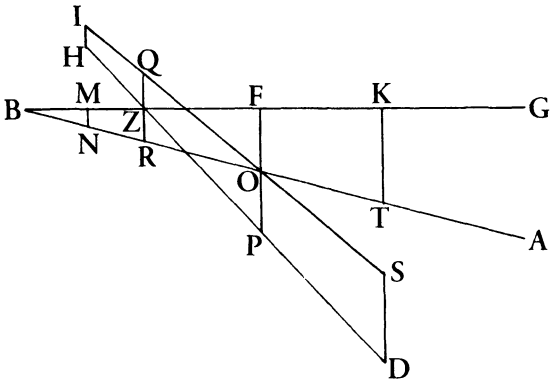


figure 3

and if **DH** is the visible object, then, as seen from **A**, it will appear along **SI**, its displacement diminishing continuously as it approaches **B** according to the amounts **TK**, **OF**, **RZ**, and **NM** (i.e., displacement **DS** =

TK; displacement $PO = OF$; displacement $RZ = ZQ$; and displacement $NM = HI$).

Diplopia is one of three visual illusions that entail image-displacement. The other two arise when the visual radiation is physically diverted by a reflecting or refracting surface. In the first case, the radiation is completely interrupted so that the flux rebounds from the surface. In the second case, the visual radiation is only partially interrupted so that the flux is diverted but not completely broken. In both cases, however, the results are similar: the object and its image occupy different locations and the image may be distorted in size or shape. Thus, things seen underwater appear closer and larger than they actually are, whereas things seen in convex mirrors appear more distant and smaller than they actually are.

Ptolemy's preoccupation with visual illusions of all kinds is clear in his effort to categorize them systematically toward the end of the second book of the *Optics*. Of the three basic types of visual illusion he lists, the first stems from the physical conditions under which vision occurs. For instance, because of a deficiency of visual flux, older people tend to have weak sight. On that account, they often misperceive distant objects. Another example is to be found in the failure to perceive the motion of rapidly spinning disks because the time-interval for detecting such motion is too short. The second type of illusion can be traced to some anomaly in the visual faculty itself. Radial breaking and bending are prime examples, because in both cases the illusion (e.g., that the object lies behind the mirror) is due to a physical disruption of the visual flux. The third, and final, type of illusion is interpretive or inferential in origin. This type of misperception is exemplified by the artistic illusions discussed above.

Ptolemy's focus on visual misperception serves as a reminder that ancient optics was the science of sight, not light, its primary goal thus being to reconcile appearance with reality. This goal is reflected in the threefold analytic structure of Ptolemy's *Optics*. First comes the analysis of appearances arising from direct, or unimpeded, visual radiation. This is the only kind of vision in which appearance corresponds to reality, albeit only under specific conditions, such as proper light and distance. The study of direct vision falls under the head of *optics* proper. Next comes the analysis of appearances arising from complete breaking, or reflection, of the visual ray. The study of this sort of vision, which is mediated by mirrors, falls under the heading of *catoptrics*. Finally comes the analysis of appearances arising from partial breaking, or refraction, of the visual ray. The study of this sort of vision, which was first systematized by Ptolemy, falls under the heading of *dioptrics*.

Thus, it is with Ptolemy that the study of optics takes canonical form according to the analysis, first, of *optics* proper, then of *catoptrics*, and finally of *dioptrics*.

In addition to systematizing the study of optics, Ptolemy gave that study an empirical, indeed an experimental, focus that is decidedly absent from Euclid's *Optics* and *Catoptrics*.⁹⁸ The clearest evidence of Ptolemy's empirical bent is found in his analyses of diplopia, reflection, and refraction. In all three cases, the phenomena are investigated on the basis of relatively simple yet ingeniously contrived experimental apparatus. In the case of diplopia, for instance, the apparatus consists of a small board upon which colored pegs and sighting lines can be placed at various locations to produce multiple imaging. Reflection is analyzed inductively through the use of a circular measuring plaque to which a sighting-device is attached and upon which plane, concave, and convex mirrors are attached for examination. Refraction, finally, is analyzed on the basis of that same plaque immersed upright in semicylinders filled with water or glass.⁹⁹

As the culminating step in the evolution of ancient visual-ray theory, Ptolemy's *Optics* reflects a number of ideas and concerns that bear directly upon Ibn al-Haytham's later analysis of light and sight. For one thing, Ptolemy's *Optics* is about the act of sight not the radiation of light. It is presumably for this reason that Ptolemy (like Ibn al-Haytham) ignores such tangential topics as the rainbow and burning mirrors that have little or nothing to do with vision. The depth of Ptolemy's concern with sight is reflected in the depth of his concern with visual illusions. Indeed, the very governing structure of his analysis—i.e., the threefold division into *optics* proper, *catoptrics*, and *dioptrics*—bespeaks this concern.

At bottom, of course, Ptolemy's analysis is based upon the visual cone, but Ptolemy (and Alhacen after him) conceives of the constituent visual rays as virtual, rather than real, entities. Using projectile motion as an analogue, Ptolemy transforms the ray into a virtual trajectory, the activity of the flux along it being thus reduced to kinetic and dynamic terms. The intensity of that radiation, as well as its resulting effect, will therefore vary according to the force of its projection and impingement along the ray. The closer to the source the projection and the more direct the impingement, the greater the effect. As will become clear in due course, Alhacen drew upon this dynamic conception of radiation to good effect in his analysis of sight and refraction.

Given its virtual status, moreover, the Ptolemaic ray becomes a mere analytic device. As such, it provides one way—but not the only way—of explaining visual phenomena. Consequently, Ptolemy's analysis of

sight is largely dependent upon, but by no means limited to, ray-geometry. That Ptolemy was well aware of the limitations of ray-geometry in explaining sight is evident from his theory of visual perception, which is ultimately based on color rather than upon the mathematical (i.e., spatial) or tangible properties of things. As the proper object of sight—and thus the only thing that is visible *per se*—color is absolutely primal. Rendered effectively visible by light, it is the first thing sensed by the visual flux. The resulting color-impression provides the basis upon which all other perceptions are derived, particularly those involving the spatial characteristics of things. Thus, as for Aristotle, so for Ptolemy, whatever else we “see” beyond color, we infer perceptually from the primal color-impression that inaugurates the visual process.

The Galenic Model of Vision: According to Galen’s description of the optic complex, primarily in the *De usu partium*, the eye is an outgrowth of the brain, its softer components springing from the *pia mater* (the inner of the two membranes encasing the brain), its harder components from the *dura mater* (the outer of those two membranes)¹⁰⁰ The hollow optic nerves form the essential connection. Originating at the forefront of the brain, on either side of its midline, they cross at the optic chiasma, whence each continues to the eye opposite its origination-point in the brain. As a result, Galen asserts, “the shape of these nerves does greatly resemble the letter Chi.”¹⁰¹ After passing through the eyesocket and reaching the eye, each nerve funnels outward to “embrace the vitreous humor like a tunic,” reaching toward the front of the eyeball where “it is [finally] inserted into the crystalline humor.”¹⁰²

Exquisitely transparent, the crystalline humor, one of three fluids or gels filling the eye, is enveloped by a very thin transparent membrane to form the crystalline lens (*krystalloiedes* = “ice-like”) toward the front of the eye. This lens takes shape as an oblate sphere that is immersed to its “equator” in the vitreous humor (*hyaloeides* = “glass-like”), a second gel contained by the eye. Filling the major portion of the ocular globe behind the crystalline lens, this humor has the consistency of fused glass and is therefore less exquisitely transparent than the crystalline humor.¹⁰³ For its part, the vitreous humor is enveloped and restrained by the choroid tunic (*chiton chorooides*), which forms the embracing extension of the optic nerve mentioned above. In fact, the choroid tunic is an extension of the *pia mater*, the softer of the two covering membranes of the brain. Along the inside surface of the choroid tunic is the retina (*amphiblestroeides* = “net-like” = retina), which, despite appearances, is not a true tunic, according to Galen. Both the retina and the choroid tunic to which it clings are attached to the crystalline lens at its equator.¹⁰⁴

Arising from the outer sheath of the optic nerve, which in turn originates with the *dura mater* of the brain, is the sclera (*chiton skleros*). This tough, durable tunic encloses the choroid and attaches along with it at the equator of the spherical crystalline lens. Its main function is to protect the softer choroid tunic and thus help it to hold the vitreous humor firmly in place. Over the sclera, finally, is an outer sheath or tunic that forms the conjunctiva. This outermost sheath is also connected to the muscles and fat surrounding and filling the eyesocket. Its anterior portion forms the white of the eye.¹⁰⁵

Figure 4 below illustrates the structure of the eye as described to this point. The ellipsoid at the right of the figure represents the oblate crystalline lens. Filled with crystalline humor, this body is immersed to its "equator" in vitreous humor. The eye, as a whole, is encompassed by two nesting tunics. The inner, black tunic is the choroid, which extends from the inner sheath of the optic nerve, this sheath originating in the brain's *pia mater*. The outer tunic is the sclera, which extends from the outer sheath of the optic nerve, this sheath originating in the *dura mater*. It, in turn, is encased by the conjunctiva, which is not shown but which covers it to the outer edges of the cornea. Inside the choroid tunic, finally, is the retina. All three of these tunics or membranes are attached to the crystalline lens at or around its "equator."

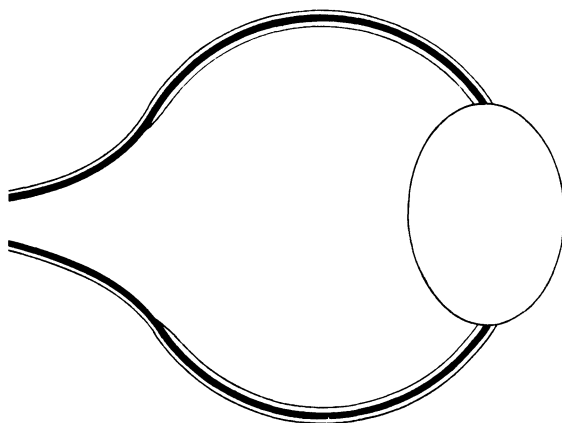


figure 4

To this point, the eye is structured in such a way that the anterior "hemisphere" of the crystalline lens protrudes from the succession of sheaths that come together at its equator. Were it to be thus exposed to external irritants, it would suffer immediate damage because of its fragile structure. Consequently, it is afforded dual protection, first by an

extension of the choroid tunic that originates at the equator of the spherical crystalline lens and enfolds some, though not all, of its anterior portion. This anterior extension constitutes what we today call the iris, the circular perforation in its middle forming the pupil. The second level of protection is provided by a thin, transparent, and very hard extension of the sclera that projects out beyond both the anterior surface of the lens and the iris that covers it. This extension constitutes the “horn-like” tunic (*keratoeides*), or cornea.¹⁰⁶ The space lying between its inner surface and the outer surfaces of the crystalline lens and iris is filled with yet a third humor, the aqueous humor (*ooeides* or *hydatoeides*), which keeps those surfaces separated.¹⁰⁷ Otherwise, continual contact between the soft outer surface of the lens or iris and the hard inner surface of the cornea would hurt the former. Figure 5 illustrates this frontal portion of the eye, with the iris extending forward from the choroid tunic to partially cover the anterior surface of the crystalline lens. The cornea, for its part, extends forward from the sclera to create a space between its inner surface and the anterior surface of the iris. This space is filled with the albumen-like (*albugineus*) aqueous humor (*ooeides*). Sheathing the sclera up to the cornea is the conjunctiva, to which the soft tissues (fat and muscle) binding the eye within the eyesocket are attached.

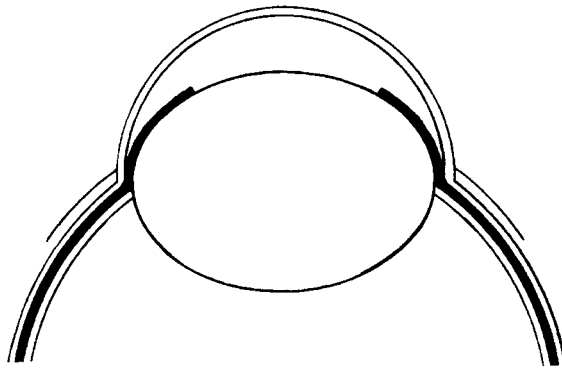


figure 5

As far as the eye's sensitive capacity is concerned, the crystalline lens plays the central role. On the one hand, it is most apt of all the ocular components to be altered by color insofar as it is “radiant, pure, and glistening.” However, Galen continues, “it would be of no use for this alteration to take place unless it was recognized by the ruling principle [i.e., the *hegemonikon*] which forms images, remembers, and reasons.”¹⁰⁸ In order for this perceptual recognition to occur, the lens must be linked to the brain, which is the seat of percipience and reason, both

faculties under control of the ruling principle. The medium through which the ruling principle exercises this control is psychic pneuma (*pneuma psychikon*), which is distilled in the brain and then passed through the hollow optic nerves to the eye.¹⁰⁹ Upon reaching the back of the eye, this pneuma is diffused to the crystalline lens through the retina, which consists of a fine network of conduits. Upon reaching the lens itself, this continual charge of pneuma animates it and thereby gives it the capacity to sense the color-impressions it receives. Those impressions are then passed back through the retinal network to the optic nerves and thence to the brain.¹¹⁰

The brain itself is divided into four ventricles or chambers. Lying side-by-side at the front of the brain, the first two ventricles are functionally paired insofar as they form the wellspring for all of the sense-conduits, including the optic nerves. It is in these two ventricles that the psychic pneuma is elaborated so as to be properly receptive of the sense-data passed through the nerves into the brain. This pair of anterior ventricles is followed by two others in succession from front to back, the central of them (i.e., the third ventricle) being the larger. At the base of the brain lies a fine network of arteries—the so-called retiform plexus (or *rete mirabile*)—into which blood charged with vital pneuma is passed upward to the head through the carotid arteries. As it circulates through this arterial network, the blood arriving through the carotid artery and infused with vital pneuma is further refined or “elaborated” to yield psychic pneuma.¹¹¹

As was mentioned earlier, Galen's account of visual physiology is rooted in the assumption that the psychic pneuma elaborated in the anterior ventricle of the brain flows through the optic complex to the crystalline lens. After perfusing the lens and thereby imbuing it with visual sensitivity, this pneumatic flux streams outward beyond the corneal surface into the surrounding air. Unlike Ptolemy's visual flux, however, Galen's pneumatic flux does not then radiate through the air to surrounding objects. Rather, it transforms the air itself into a percipient extension of the optic complex extending from the brain, through the optic nerves, to the front of the ocular globe. What results is a cone of visibility with its vertex at the eye and its base ever-expanding over distance. Strictly speaking, then, Galen's theory is not extramissionist—certainly not in the same sense as the Euclidean-Ptolemaic visual-ray theory—because, according to Galen's physical account, what passes from eye to object is a pneumatic effect, not a material efflux.

Galen agrees explicitly with Aristotle, and thus implicitly with Ptolemy, that color, and color alone, constitutes the proper object of sight.¹¹² Without color, then, no physical body can be seen. Further-

more, even if it is colored, such a body will remain invisible unless the air within which it subsists is properly illuminated and therefore rendered permeable to sight. In essence, then, illumination transforms the air from opaque (dark) to transparent, a transformation that is complementary to the alteration caused by psychic pneuma. Thus, as Galen puts it:

When [the air] has been illuminated by the sun, it is already an instrument of vision of the same description as the pneuma coming to it from the brain; but until it is illuminated it does not turn into a sympathetic instrument by virtue of the change effected in it by the outflow of the pneuma¹¹³

So transformed by light, the air is apt to assimilate the color of various bodies within it, the resulting alteration being transmitted almost instantaneously through it to surrounding bodies, including the eye.¹¹⁴ Hence, for Galen, as for Aristotle, light serves as a catalyst for, rather than an object of, vision.

The Galenic cone of visibility alluded to previously is the product of complementary transformations of the air: one by the external light of such sources as the sun, the other by the internal light, or pneuma, of the eye.¹¹⁵ In its properly altered state, the air has two functions: to permit the eye to make visual contact with outlying objects and to serve as a medium through which the information gained by that contact is conveyed back to the optic complex for visual scrutiny. The resulting visual impression, which occurs at the crystalline lens, is of color; and from that initial, primitive color-impression is derived a set of secondary impressions about the spatial disposition of the object seen. According to Galen's own summary, then:

The proper object of sight . . . is the class of colors. For colors are the first thing it perceives, and it perceives them by itself, and it alone of all sense organs perceives them [and] it alone can discern along with the color of the thing seen its size and shape [as well], in addition to other things, the position and distance of the colored body.¹¹⁶

These properties, Galen goes on to say, "are incidental [insofar as] they require reasoning and memory, not merely sensation—at least in the case of touch and sight."¹¹⁷ Suffice it to say, these incidental properties, which are seen at a secondary, inferential level, are strongly reminiscent of Aristotle's common sensibles.

Geometrically, the cone of visibility that is created in the surround-

ing air by ocular pneuma and ambient illumination can be thought of as a bundle of cobweb-thin filaments radiating from the vertex-point in the pupil of the eye. Each filament constitutes a radial sighting-line connecting the center of sight to a given point in the plane of the visual field. These lines are perfectly rectilinear.¹¹⁸ Since we actually see with two eyes and therefore with two visual cones, neither eye shares precisely the same visual field. Accordingly, everything seen by the right eye appears somewhat to the left of everything seen by the left eye. As figure 6 illustrates, if **GD** is the object seen by the two eyes **A** and **B**, then, against the background of the larger circle of the visual field, **GD** will appear in different sectors according to whether it is viewed by **A** or **B**. From **B**, for instance, it will appear in sector **TI**, whereas from **A** it will appear in sector **EZ**. Furthermore, since object **GD** is oblique with respect to both visual cones, the two visual axes will not intersect its surface at the same point, as it should do by Ptolemy's account

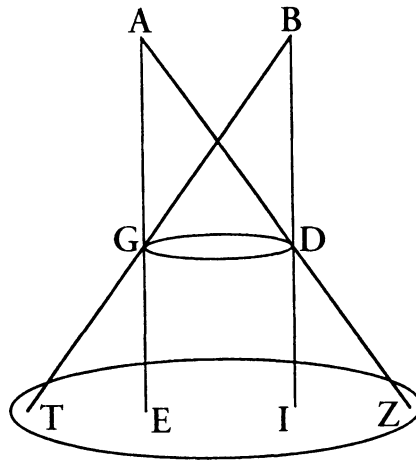


figure 6

Hence, given the imperatives of Galen's analysis, **A** and **B** will not see that object at precisely the same spot. Nevertheless, when we look with both eyes, the object appears to occupy a single spot midway between where **A**'s and **B**'s images appear.¹¹⁹ In short, image-fusion does not occur at the object's surface. But if not there, then where? In response to this question, Galen points to the joining of the optic nerves at the optic chiasma. "Nature," Galen assures us in explanation, "does some things for a principal reason and others out of her abundance; so here too [i.e., in having the nerves cross at the optic chiasma] the first and most necessary use is to keep us from seeing external objects

double.”¹²⁰ That we normally see single rather than double images is therefore due not so much to the geometry as to the physiology of vision. Still, Galen agrees with Ptolemy that diplopia is the result of a displacement of the eye so that, in essence, the two axes fail to meet properly on the object’s surface.¹²¹

Conclusion: There is no denying the fundamental differences among Aristotle’s, Ptolemy’s, and Galen’s accounts of sight. Aristotle’s theory is, after all, unequivocally intromissionist, Ptolemy’s unequivocally extramissionist, and Galen’s equivocally extramissionist. Yet despite such differences, the three accounts by no means conflict with, much less contradict one another, at all levels. Indeed, in certain ways they can be viewed as complementary. All three thinkers agree that color is the proper object of sight, the sole visible *per se*. All three agree, as well, that there must be a properly transparent medium between eye and object if vision is to occur. All three agree that the color-effect that induces vision is somehow conveyed back through this medium to the eye for perceptual delectation. All three agree that light is a necessary precondition for, but not, strictly speaking, a proper object of, sight. And all three agree that spatial perception is mediate rather than immediate.

This complementarity is especially clear in the case of Ptolemy and Galen, whose accounts of visual perception have far more in common than in conflict with one another. This is hardly surprising, given that the intellectual context within which the two thinkers worked was one of eclecticism and that both drew upon many of the same sources. Among the authorities explicitly acknowledged by Galen, Aristotle, Plato, Erasistratus, Herophilus, “Hippocrates,” and various Stoics figure prominently. Galen is far from uncritical in his use of these sources, though. For example, while agreeing with Aristotle that color is the proper object of sight, he disagrees vehemently with Aristotle’s claim (echoed by the Stoics) that the heart serves as the seat of sensation and reason.¹²² Citing Plato as support, he locates this ruling principle in the brain, rather than the heart, and he goes on to provide both empirical and theoretical justification for this position.¹²³ Likewise, while adopting the pneumatic system championed by the Stoics, at least in a general way, Galen rejects the Stoic idea that the pneumatic connection between eye and object acts as a sort of walking stick by means of which we visually feel our way about the physical world.¹²⁴

Ptolemy, as well, draws upon many of the same sources, although, unlike Galen, he does not mention them by name. Still, there are discernible traces of Aristotelian and Stoic, perhaps even Platonic, ideas throughout his works.¹²⁵ It not unlikely, for example, that Ptolemy fol-

lowed the Stoic lead in his conception of visual flux, understanding it as a pneumatic stream originating in the soul and passing through the eye to the outside air. Moreover, like the Stoics and Galen, Ptolemy posits a sovereign faculty (*virtus regitiva* = "governing faculty" = *hegemonikon*) that operates through a generalized "nervous principle" (*principium nervosum*) to regulate all perceptual and intellectual functions.¹²⁶

In view of these considerations, it is evident that Ptolemy and Galen were at pains to accommodate and integrate not only a variety of ostensibly disparate sources (e.g., Aristotle, the Stoics, Plato, Euclid), but also a variety of ostensibly disparate disciplines (i. e., "physics" or natural philosophy, mathematical optics, anatomy and physiology, and psychology) into their accounts of visual perception. Their ultimate goal in this, presumably, was to place the study of visual perception on as broad a theoretical and empirical basis as possible. Thus, well over eight centuries before Ibn al-Haytham undertook his grand optical synthesis in the *Kitab al-Manazir*, the pattern of accommodation and integration was already well established in his key Hellenistic sources.

4. *Ibn al-Haytham's Sources in Context*

General Intellectual Background: The roughly 600 years between the death of Ptolemy (late second century) and the ascendancy of the Abbasid caliphate in the second half of the 700s seems, given the textual evidence, to mark a period of intellectual stagnation, if not regression. There are a few bright spots—e.g., Diophantus' work on "algebra" (later third century?) and some of the critical Neoplatonist commentaries on Aristotle¹²⁷—but all evidence points to the conclusion that during these six centuries little was done to build on the classical intellectual heritage. Indeed, in some cases, optics in particular, that heritage was barely preserved, and then only in a fragmentary way.¹²⁸

With the accession of the Abbasid dynasty at the expense of the Umayyads in 750 came an incipient "Hellenization" of Islam along with a fundamental shift away from the militarism and conservatism of the Umayyads. This shift toward a more favorable political and intellectual climate was symbolized in the change of capitals from "Arab" Damascus to "Persian" Baghdad. Although the process of intellectual recovery under the Abbasids started quite early, with al-Manṣūr (754-775), it took off in earnest under the patronage of Hārūn ar-Rashīd (786-809) and his son al-Ma'mūn (813-833). Not only did both caliphs encourage scholars to root out Hellenic and Hellenistic texts, but al-Ma'mūn established a scholarly center at Baghdad, the House of Wisdom, where

scholar-translators, most notably Ḥunayn ibn Ishāq (808-873), were given the resources to render these texts into Arabic either directly or through the mediation of Syriac.

Accordingly, by the second half of the ninth century, an extensive corpus of classical scientific and philosophical works was becoming accessible in Arabic. Among the earliest scholars to take advantage of this intellectual windfall was Ya'qūb al-Kindī (801-866), who spent a considerable portion of his scholarly life in Baghdad, presumably associated with the House of Wisdom. Like so many Arabic thinkers after him, al-Kindī did not just assimilate this classical bequest; he subjected it to close, critical scrutiny, revising and molding it to his own purposes. "Numerous themes and concepts that were elaborated by the Greeks," observes Roshdi Rashed in a recent study, "were selected and reconceptualized by al-Kindī, integrated into the original work that he himself constructed."¹²⁹ al-Kindī and his successors, in short, were engaged not merely in transmitting but in appropriating classical thought.

Between al-Kindī's death and the early eleventh century, Arabic thinkers had developed their own corpus of philosophical and scientific works in the form not only of critical commentaries, but also of original treatises. These were based on classical sources, to be sure, but in many respects they transcended those sources in acuity and depth of insight. Hence, by the time Ibn al-Haytham undertook his study of vision, not only had the core sources for that study been transformed in various subtle and not-so-subtle ways, but the interpretive context within which they were read had also been transformed. With that in mind, let us first look at Aristotle's account of visual perception as it was received and revised between the time of al-Kindī and Ibn al-Haytham's somewhat younger contemporary, Ibn Sīnā, or Avicenna (980-1037).

Psychology and Epistemology: As we saw earlier, Aristotle provided a rather vague account of sense-perception and its psychological underpinnings in the *De anima*. By Ibn al-Haytham's day, that account had undergone a modicum of specification in terms of particular psychological faculties accorded particular functions in a more-or-less hierarchical order.¹³⁰ In his extensive discussion of psychology and epistemology in the *Kitāb al-Shifā'*,¹³¹ for instance, Avicenna outlines this system of faculties and functions roughly as follows. First, each proper sensible is conveyed through its appropriate channel (sight, taste, touch, etc.) to the common sense. There the individual proper sensibles are gathered together into a single, unified sense-representation that is passed to the imagination (fantasy), which serves as a temporary repository for such representations. These formal impressions are then

arranged by a subsequent imaginative faculty (cogitative in nature), which puts them into a sort of discursive order according to which the next faculty, that of estimation, is enabled to make various inferences or judgments. The final faculty is memorative. It is in this faculty that the formal conclusions drawn by estimation or reason come to rest, eventually to be recalled as general models (or universals) according to which new perceptions (or forms) can be recognized and evaluated.¹³²

If, as this model suggests, sense-induction unfolds in stages from lower (sense) to higher (reason) faculties, then it must occur somewhere in the physical structure of the body. In short, the "soul," with its attendant faculties, must have some material substrate within which to carry out its perceptual and epistemological functions. Aristotle and the Stoics, of course, looked to the heart as the seat of these functions. But, as Galen observed, it made more sense to locate them in the brain, where all of the sensory nerves come to focus. Galen, moreover, had pinpointed an appropriate material substrate for these functions in the pneuma pervading the cerebral ventricles. "It is better, then," he concluded, "to assume that the soul dwells in the actual body of the brain . . . and that the soul's first instrument for all the sensations of the animal, and for its voluntary motions as well, is this pneuma."¹³³

Arabic thinkers were not slow to seize on the implications of this account. Why not, in fact, locate the material, or "sensitive," soul in the brain and explain its functions in terms of the brain's physical structure? In response, medieval Arabic thinkers undertook to "Galenize" Aristotelian psychology by, as it were, mapping the faculties within the brain itself. Accordingly, the faculty of common sense was located in the frontal pair of ventricles, where the sensory nerves converge. Accepting the sense-impressions conveyed by those nerves, this faculty acted in concert with the imagination, Aristotle's *phantasia*, to subject those impressions to perceptual elaboration. For their part, the estimative and cognitive faculties were located in the brain's central ventricle, where the perceptual representations formed in the imagination were passed for further, discursive elaboration. The results of that elaboration, finally, were remanded to the posterior ventricle of the brain, where they were stored for recall.

Not everyone agreed about the precise number or terminological designation of these faculties; nor, for that matter, did everyone agree about the precise internal structure of the brain.¹³⁴ However—and this is the crucial point—all of these thinkers worked within, and elaborated upon, the same conceptual framework and, in the process, articulated a model according to which sense-perception and its epistemological entailments could be readily explained in anatomical and physiological

terms. Equally important, by the time Ibn al-Haytham undertook his study of vision, that model had achieved more-or-less canonical status within the Arabic tradition of natural philosophy, particularly along the Aristotelian line of development. Whether, in fact, Ibn al-Haytham had that model in mind as he framed his own account of visual perception is by no means certain, but, as we shall see, there is reason to suppose that he did, at least to some extent.

Anatomy and Physiology: Like Aristotle within the medieval Arabic philosophical tradition, Galen carried enormous weight as an anatomical and physiological authority within the medieval Arabic medical tradition. This deference to Galen's authority was, of course, well-founded in view of his obvious acumen as both observer and critical thinker. It should therefore come as no surprise that, from at least the mid-ninth century on, the anatomical and physiological basis of Arabic medicine became Galenic to the core. It should also come as no surprise that, like Aristotle, Galen did not pass unchallenged, despite a general acceptance of his conceptual framework.

Among the earliest of Galen's Arabic partisans was Ḥunayn ibn Ishāq. A Nestorian Christian and physician, Ḥunayn spent most of his professional life in Baghdad, where, like his close contemporary, al-Kindī, he had firm ties to the House of Wisdom. Such was his fame as both scholar and medical authority that he was eventually appointed head physician to the caliph, a post he held, with one brief interruption, until his death. Having demonstrated a rare facility with languages, Ḥunayn was early charged with finding Greek texts and translating them into Syriac or Arabic. That he accepted this charge with alacrity is clear from the number of works he eventually translated, or whose earlier translations he revised. Although several of those works are of philosophical import (e.g., Plato's *Timaeus*, Aristotle's *De anima* and *Metaphysics*), the majority deal with medical subjects. Of that majority, the overwhelming majority are Galenic—some 130 treatises in all.¹³⁵

In addition to these translations, Ḥunayn wrote a number of original pieces, many of them, as might be expected, focusing on medicine. Among these original works, one in particular concerns us here: an ophthalmological compendium entitled *The Ten Treatises on the Eye*.¹³⁶ In the first three treatises of this compendium, Ḥunayn provides a complete description of the anatomy, physiology, and function of the eye. Almost all of what he has to say is a recapitulation of Galen's earlier account. Accordingly, Ḥunayn describes the same three humors (albuminous, crystalline, and vitreous in order from front to back) and the same succession of tunics from outside in, three toward the front of the

eye (conjunctiva, cornea, and uvea) and three toward the rear (sclera, choroid, and arachnoid—or retinal). The eye as a whole, he continues in the same Galenic vein, is attached to the hollow optic nerve, which consists of two sheaths, the innermost, and softer, of which gives rise to the choroid tunic, the outermost, and harder, of which gives rise to the sclera. Originating on both sides at the forefront of the brain, these nerves descend to the optic chiasma and, after joining there, continue to their respective eyes.

The brain itself, Hunayn echoes Galen, is divided into four cavities, or ventricles, which are charged with animal (i.e., psychic) pneuma. Elaborated from vital pneuma carried through the retiform plexus at the base of the brain, this animal pneuma pervades all four ventricles. In the front two, which are paired, the animal pneuma takes a particular form suitable to sensation.¹³⁷ The portion of this sense-receptive pneuma that passes into the hollow optic nerves is, in turn, suitable for visual sensation. Conducted by those nerves into the eyes, this visual pneuma flows through the appropriate retinal passages to the crystalline humor and proceeds thence through the pupil to the surface of the eye. From there it enters into the surrounding illuminated air and, upon meeting it, transforms it into the instrument through which the eye establishes visual touch with external objects. All that is actually sensed on that basis is color, so color is the proper object of sight. As such, it provides the means by which the object itself and its spatial properties (i.e., size, shape, situation, distance, and movement) are perceived.

As described to this point, Hunayn's account of the eye's structure and function represents little more than a variation on Galen's theme.¹³⁸ But Hunayn adds one distinctly jarring note. Instead of locating the crystalline lens toward the front of the eye, as did Galen, he placed it at the very center, and he did so quite purposefully. What makes this relocation of the crystalline lens significant is not so much the relocation itself as Hunayn's reason for carrying it out. Quite simply, it was to restructure the eye in a more systematic and functional way than had Galen. The lens had to be in the center because, as Hunayn himself puts it, "all that surrounds it in the eye was created for it, either to protect it from injury or to be useful to it. Therefore, those parts surround it from all sides, whilst it is in the middle itself."¹³⁹

The shape of the lens is functional as well. It is oblate, rather than perfectly spherical, so that it can "receive impressions of more perceptible objects than would be the case if it were perfectly round; for a flattened body meets more of the objects which are in its path than does a perfectly spherical body."¹⁴⁰ At first glance, this looks like a mere restatement of Galen's assertion in *De usu partium*, X, ii, 111 that the crys-

talline lens is flattened so that “a greater part of it would be in . . . communication [with external objects], because the straight lines touching a body will embrace a smaller part of it if it is very convex.”¹⁴¹ As Bruce Eastwood points out, though, there is a subtle but important difference between the two claims. Galen, on the one hand, stresses the efficiency with which the lens is designed to take visible impressions (i.e. to communicate with objects) on a relatively minimal surface-area. Hunayn, on the other, stresses the effectiveness with which the lens is designed to widen the visual field.¹⁴² Hunayn’s reasoning is therefore essentially functional, Galen’s essentially aesthetic, in orientation. Or to put it in somewhat different terms, for Hunayn, the lens is flattened so that it can achieve greater operational efficiency (via the most effective use of space); for Galen, it is flattened so as to achieve greater physical efficiency (via the least wasteful use of space).

As far as the physical and functional structure of the eye as a whole is concerned, the difference between Galen and Hunayn boils down to a reversal of the terms of explanation. For Galen, the teleological argument proceeds from effect to cause: because the eye is structured in a certain way, then, given its visual function, it *ought* to be structured in that particular way. For Hunayn, on the other hand, the direction of argument is from cause to effect: because the eye, given its visual function, *ought* to be structured in a certain way, then it must be structured in that particular way. There is thus a fundamental apriorism in Hunayn’s approach that is missing from Galen’s. It is this apriorism that permits him to reconstruct the eye in response to theoretical imperatives that force him to ignore the observed fact that the crystalline lens lies nowhere near the center of the eye. As will become clear later, when we examine Alhacen’s account of ocular anatomy, this same sort of apriorism is at play, leading Alhacen to describe an eye that is at least as theoretical as it is real in its physical structure.

Optics: While Arabic philosophy and medicine developed along increasingly systematic lines between the late ninth and early eleventh centuries, the same cannot be said of Arabic optics, at least not if we are to judge by the sparse textual evidence so far uncovered. For one thing, there is no indication of a concerted effort before Ibn al-Haytham to formulate a complete and coherent account of visual perception in the mold of Ptolemy’s *Optics*. This failure may well have been due to the lack of an appropriate model. For, to the best of our knowledge, Ptolemy’s *Optics* remained virtually unknown to, or ignored by, Arab scholars until relatively late.¹⁴³ Thus, in its early development, Arabic optics tended to be “Euclidean” in its basic approach.¹⁴⁴

The earliest indisputable testimony to the use of Ptolemy's *Optics* comes with the mathematician, Ibn Sahl (fl. c. 980), who took Ptolemy's analysis of refraction in the fifth book of the *Optics* as the springboard for his own analysis of burning mirrors and lenses.¹⁴⁵ Although there is no disputing the ingenuity and sophistication of that analysis (Ibn Sahl formulated Snel's law of refraction in the process of analyzing lenses), the fact remains that his primary concern was with light, not sight. Furthermore, Ibn Sahl's approach was problem-oriented rather than theoretical; he was concerned with solving a discrete set of problems rather than creating a broader theoretical or analytic framework within which to understand them.

This piecemeal approach characterizes most of the optical works from the period under discussion. At separate occasions, for instance, al-Kindī addressed the problems of parabolic burning mirrors and image-magnification through refraction.¹⁴⁶ Equivalently focused studies by Hellenistic and early Byzantine authors were also in circulation during this period. Anthemius of Tralles' rather maladroit study of parabolic burning mirrors was certainly known to Ibn Sahl, who also mentions a certain "Dtrums" in the course of his analysis.¹⁴⁷ Likewise, Diocles' exquisite study of spherical and parabolic burning mirrors was probably known by at least the late tenth century, and Ibn al-Haytham may have relied upon it, among other works, for his own *De speculis comburentibus seu de sectione mukefi*.¹⁴⁸ On reflection in general, we have two works entitled *De speculis*, one ascribed to Tideus, the other to Euclid, this latter text apparently an Arabic compilation of theorems from Euclid's *Optics* and *Catoptrics*, as well as from Hero of Alexandria's *Catoptrics*.¹⁴⁹ On refraction we have al-Kindī's study as well as that of a certain "Fūthīṭos" (an Arabic transliteration of the Greek name "Potitos"?), and on optics in general we have al-Kindī's "Optics" (*De aspectibus*) and Aḥmad ibn 'Īsā's ninth-century "Book on Optics and on Burning Mirrors." None of these studies, however, no matter how general the scope, offers a truly systematic theoretical treatment of its subject.

Al-Kindī's *De aspectibus* is especially intriguing as an example of how Euclidean ray-theory was developed and revised within the Arabic context.¹⁵⁰ As one might expect, al-Kindī follows Euclid in supposing the eye to be responsible for making contact with external objects; his theory, in short, is extramissionist. Yet somewhat unexpectedly, al-Kindī rejects Euclid's assumption that the eye emits a material flux along discrete lines to establish this contact. Rather, for al-Kindī, the eye exerts a power (*virtus*) that renders external objects visible, in much the same way that light exerts the power of illumination on things. Furthermore, if what passes from the eye is immaterial, then it cannot be discrete. Visual

radiation, in short, must be continuous, so the constituent rays, as well as the visual cone formed by them, are virtual, not real.¹⁵¹ Al-Kindī illustrates this point in proposition 14 of the *De aspectibus*. Suppose that the visual power is generated at points **A**, **B**, and **G** on the surface of the eye, whose center is **D** in figure 7. That power will propagate in all possible directions from each point within the plane **HLK** to form arcal segments **HIT** (for point **A**), **ELZ** (for point **B**), and **ITK** (for point **G**). Clearly, then, these arcal segments will overlap, and the closer to axial line **BL** they get, the more of them will overlap. Hence, the area of greatest overlap, where the visual power is most concentrated, will be in the vicinity of point **L**.¹⁵²

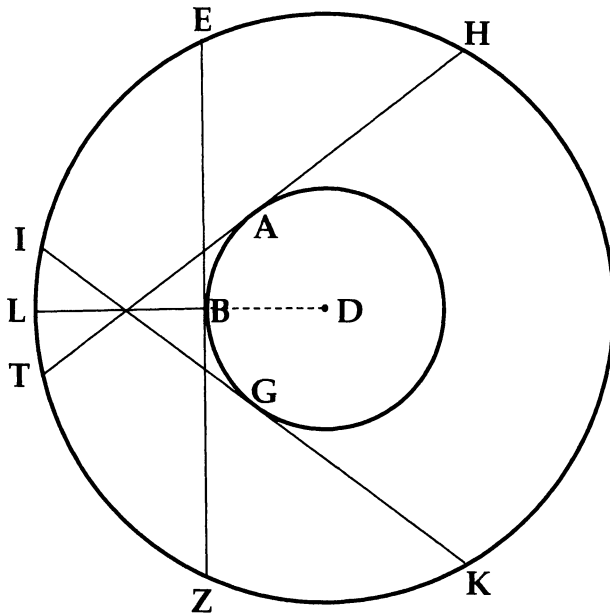


figure 7

With this demonstration, al-Kindī has brought three points to the fore. First, radiation should be understood as absolutely punctiform, each “luminous” point radiating its “form” in a sphere of propagation, insofar as that is possible, barring any impediment (as, for example, from the surface of the eye). Second, radiation is absolutely continuous; it does not occur along discrete, rectilinear lines, although the sphere of propagation can be resolved into such lines for analytic purposes. Third, the operative part of the eye in the generation and propagation of visual power is not the center, as it is for Ptolemy and, by implication, Euclid; it is, rather, the surface itself. Thus, although the axial line that connects

L, the point of maximum concentration, and point **B** on the surface of the eye runs straight through centerpoint **D**, this connection is incidental, or accidental, not essential. Centerpoint **D** is therefore geometrically relevant but physically irrelevant.

Conclusion: How many of the psychological/epistemological, medical, or optical sources discussed in this section were actually known to Ibn al-Haytham, much less drawn upon by him in the composition of his *Kitāb al-Manāẓir*, is a moot point, given his failure to cite sources by name.¹⁵³ That his work bears apparent (and I stress “apparent”) traces, in idea and conception, from those sources is suggestive but not probative. What our brief survey does establish beyond doubt, however, is that Alhacen’s work on visual perception fits within an evolving intellectual tradition that is both complex and integrative. This tradition is well-represented according to the three groups cited at various reprises in the *De aspectibus*: (1) natural philosophers (*naturales*), such as al-Fārābī and Avicenna, as well, to some extent, as al-Kindī and Ḥunayn; (2) practitioners of the medical art (*ars medicinalis*), such as Razes and Ḥunayn; and (3) “mathematicians” (*mathematici*), such as al-Kindī, Aḥmad ibn ‘Īsā, and Ibn Sahl. It is therefore safe to assume that when he refers to these groups and their opinions, Alhacen has in mind, if not the actual representatives we have mentioned, then others of their ilk.

5. *Alhacen’s Account of Visual Perception: An Overview*

Background Summary: Alhacen’s account of visual perception is exceptionally cautious and considered. There is remarkably little in it that is overtly hypothetical or deductive and much that is overtly empirical and inductive. Furthermore, Alhacen is extraordinarily systematic and precise, almost mathematically so, in developing that account element-by-element in a logical order that is as inexorable as it is clear. Leaving virtually nothing to chance, he guides the reader along by the shortest of leashes, not only forcing him to follow the beaten path within straitened bounds, but also pointing out the exemplary landmarks—in the way of illustrative examples, many of them experimentally-based—along the way. As a result, Alhacen’s exposition tends to come across as somewhat repetitive, even long-winded, a fact that led his Latin disciple Witelo to charge him somewhat uncharitably with tediousness.¹⁵⁴ But what Witelo viewed as tediousness is better understood as completeness. Alhacen was determined to ensure that his readers not only fully understood the rationale behind his account and its attendant claims, but

also grasped the entire range of supporting evidence.

For the most part, our overview of Alhacen's account of visual perception will follow the order of his presentation. We will begin with his analysis of the physical grounds of sight in the radiation of light and color through transparent media. We will then turn to his account of the eye and its structure, for it is in terms of that structure, according to Alhacen, that the eye is uniquely suited to see. With that established, we will pass to his explanation of the peculiar sensitive capacity of the eye and how it permits the eye to select coherent visible impressions from the light and color radiated to it from external objects. As we shall go on to see, the forms or "images" derived from these visible impressions provide the basis for our perceptual apprehension of physical characteristics that are not truly visible. These range from size and shape to beauty and ugliness. In the process, we will examine Alhacen's account of visual certification, according to which we make actual sense of what we see. Having thus ascertained how, under proper circumstances, we achieve a veridical perception of external particulars, we will close with an account of visual illusions, or misperceptions, and their genesis in the transgression of certain threshold conditions critical to proper visual perception.

The Physical Grounds of Sight: According to Alhacen, eight preconditions must be met if visual perception is to occur at all, much less properly. First, there must be some separation between the eye and the object that is to be seen. Second, the object must face the eye. Third, the object must be of a perceptible size. Fourth, it must face the eye long enough to be perceived. Fifth, there must be some light present. Sixth, the object must be at least somewhat opaque. Seventh, there must be a continuous transparent medium between eye and object. And, finally, the eye itself must be adequately sound to fulfill its basic visual function.¹⁵⁵ These preconditions are normative; an excess or deficiency in any of them will impede proper vision. Too little light, too much distance between eye and object, or an inordinately impaired eye can cause an object not to be seen, even when, *ceteris paribus*, it should be.

Of the eight preconditions listed above, the last four are of special concern to us here, so let us deal with them in order, starting with light. According to Alhacen, light (*lux*) is an inherent and essential property of self-luminous objects, such as the sun or stars. Thus embodied, light is inherently disposed to replicate itself through continuous transparent media. Such media, in turn, are inherently disposed to accept and transmit light as a similitude, or formal representation (*forma*), of its original instantiation in the luminous object. In this state, as an accidental mani-

festation of itself in the transparent medium, light is generally designated by the Latin term *lumen*.¹⁵⁶

Each point on the surface of a luminous object is to be thought of as an independent source of radiation, propagating its form everywhere transparency permits. Ideally, what results is a sphere of propagation within which every radius represents a rectilinear trajectory, or ray, along which *lumen* is transmitted.¹⁵⁷ All luminous surfaces can be resolved into a mosaic of independent point-sources sending their forms outward in all possible directions. It is crucial to realize, however, that the radial lines along which light is assumed to propagate are virtual rather than real. In actuality, light emanates from spots, not actual points, on the luminous surface, and the ensuing sphere of propagation is perfectly continuous. The mathematical ray is thus a virtual representation of the physical ray, which is itself an abstraction from the continuous physical sphere of propagation.¹⁵⁸

Opacity (*densitas* or *soliditas*) is the gauge of an object's ability to block light. In the case of reflective bodies, this ability is manifested in their capacity to make all or most incoming light rebound. In the case of all other opaque bodies, their ability to block light is manifested in the capacity to absorb or trap it. Surface-texture differentiates the two, reflective bodies being smoother than nonreflective ones. Opacity is relative. Some objects are perfectly opaque, absorbing all the light that shines upon their surfaces. Others are only partially so, their surfaces absorbing some of the incoming light and allowing the rest to pass through. Misty air is an example of the latter. Once they have absorbed incoming light, opaque bodies become luminous sources in their own right, radiating light in precisely the same way as self-luminous bodies, although more weakly. The light that is propagated in this mediate fashion is referred to by Alhacen as "secondary light" (*lux secundaria*) to distinguish it from the primary light (*lux prima*) that shines from inherently self-luminous bodies.¹⁵⁹

Color is a natural concomitant of opacity, so, at least in practice, if not theory, neither can exist without the other. Like light, color is naturally apt to replicate itself through transparent media, but its "illuminative" effect is far weaker than that of light.¹⁶⁰ On its own, in fact, color has virtually no illuminative effect, as is evident from our inability to see things in pitch-black darkness. In order to manifest itself—e.g., by shining on other opaque objects and imparting its own hue to their surfaces—color requires illumination. Color and light are naturally disposed to intermingle, light providing color with the ability to shine, color in turn providing light with a sort of screen upon and through which to exert its illuminative power. Hence, while they are ontologically dis-

tinct, light and color seem not to be functionally distinct for Alhacen. On the one hand, color cannot manifest itself without light. On the other, all physical bodies possess some opacity by virtue of which they tinge the light that strikes or passes through them. Pure light would thus seem to be a theoretical abstraction rather than a physical reality for Alhacen.¹⁶¹

Transparency (*diafonitas*) is the obverse of opacity, the gauge of a body's ability not to block but to transmit light. Like pure light, perfect transparency seems to be a theoretical abstraction instead of a physical reality for Alhacen. Even such exquisitely transparent media as clear air and pure crystal are not perfectly diaphanous. They have at least a modicum of consistency (*spissitudo*) that enables them to trap some of the light radiating through them. Thus, for example, as light passes into a deep pool of clear water, the water imparts a bluish tinge to it. Likewise, in passing through hazy air, light takes on a whitish cast from the vapor that perfumes it.¹⁶²

The consistency of transparent bodies also seems to be responsible for their tendency to refract or deflect light that penetrates their surfaces at an angle. This refractive effect is not, however, due to the intrinsic color of the medium or the presence of adulterants in it. Milky water, for example, is no more refractive than clear water. The internal structure of such refractive media seems to be the determining cause, so that the looser and more permeable that internal structure, the less resistance the body poses to the penetration of light and, therefore, the less its refractive tendency. The more compact the internal structure, on the other hand, the greater the resistance and, therefore, the more the passing light is shunted toward the normal.¹⁶³

In terms of how they act upon, and react with, physical bodies, radiated light and color possess certain dynamic qualities. For one thing, according to Alhacen's rather convoluted argument in II, 3.60-62 (see pp. 445-447 below), both take time, albeit an imperceptibly short time, to traverse space. For another, both continually lose intensity as they radiate ever farther from their source. For yet another, the intensity with which they illuminate physical bodies depends upon how directly they impinge upon those bodies: the more direct the impingement, the more intense the effect. Radiated light and color can therefore be understood by analogy to projectiles shot at great speed from their source, the intensity of their impact upon opaque or transparent surfaces varying inversely with the distance and directly with the angle at which they strike those surfaces.¹⁶⁴

Under these conditions, the basic function of the eye is obvious enough: to be affected by the forms of light and color that strike it. To

establish this point, Alhacen is at pains in the first five chapters of book 1 in the Latin text to show by common experience how light and color affect sight in various ways depending upon ambient circumstances. An overly bright light or color, for instance, can impair the eye's proper functioning by creating an after-image that overshadows the effect of fainter light- or color-forms upon the eye. Strong colors seen in faint light will not be properly revealed to the eye. The transparency of diaphanous objects that are deeply colored may not be seen in faint light, whereas in stronger light it will become apparent. A firefly seen in daylight will not appear luminous. Every one of these examples is meant to show not only how light and color affect the eye in various ways, but perhaps more important that in order to see, the eye must be affected by them. The eye, in short, does not reach out toward objects to see them. They reach in to it, manifesting themselves through their radiated light and color.¹⁶⁵

Before going on to the next subsection, let us pause briefly to consider the similarities and differences between Alhacen's account of the physical grounds of sight and the accounts of Aristotle, Ptolemy, and Galen. To start with, there is no question that Alhacen's account lends itself to Aristotelian analysis in terms not only of potency and act, but of the four causes as well. As conceived by Alhacen, for example, color on its own is no more than potentially visible. Only with the addition of light, which gives it the power to replicate itself formally, does it become actually so. The eye, for its part, has the potential to see, but that potential remains unrealized until the eye is properly affected by the illuminated color-forms that strike its surface. Those color-forms, meanwhile, play formal cause to the medium's material cause, their visual effect in the eye constituting the final cause. The color-form also serves as the efficient cause, its natural propensity toward self-replication moving it to act. Now whether Alhacen (or, more properly in this case, Ibn al-Haytham) actually thought in such causal terms, even implicitly, as he framed his account of radiation and sight is subject to debate. There is certainly nothing explicit in that account to indicate that he did. Yet, as we shall see, his Scholastic followers, particularly Roger Bacon, seized upon the Aristotelian implications in (or perhaps read them into) Alhacen's account and brought them to the fore as they sought to give it firmer theoretical underpinnings.¹⁶⁶

There are, in addition, several specific points of agreement among Alhacen, Aristotle, Ptolemy, and Galen. All four concur that color is the proper object of sight. All four concur that it is a real, objective property of physical bodies. All four concur that without light color cannot be seen. All four concur that, properly speaking, the act of visual percep-

tion begins at (or quite near) the anterior surface of the eye. At least three of them—Alhacen, Aristotle, and Galen—concur that sight requires a properly disposed, continuous medium between eye and object. And, finally, like Ptolemy (as well, by the way, as al-Kindī), Alhacen conceives of the ray as a virtual rather than an actual entity, an analytic convention rather than a physical reality. Like Ptolemy, moreover, Alhacen vests his rays with certain dynamic properties in order to explain how they interact with physical bodies.¹⁶⁷

As to points of disagreement, at least between Alhacen, on the one hand, and Ptolemy and Galen, on the other, the most obvious lies in Alhacen's unequivocal intromissionism. Indeed, Alhacen expends considerable effort to invalidate the theory of visual rays, not by refuting it outright but by showing that it is redundant. After all, even the proponents of visual radiation are forced to suppose that once the rays make contact with external objects, they must somehow convey the information garnered from that contact back to the eye. Why then, he concludes, posit both an outward and an inward reach when a single inward one suffices? To posit visual rays is therefore otiose.¹⁶⁸

Another point of disagreement between Alhacen and his Greek predecessors has to do with the status of light. For Galen and Aristotle, light is a mediating entity that renders the air between eye and object open to sight. For Alhacen, on the other hand, such media as air and water are actually and inherently transparent. They have no need of light to dispose them to that state. Rather than mediating vision, then, light is *per se* visible for Alhacen. Nonetheless, as for Ptolemy, so for Alhacen, the primary function of light is not to be seen but to render color visible.

The Anatomical and Physiological Structure of the Eye: In its overall form and structure, the eye described by Alhacen in book 1, chapter 6 of the *De aspectibus* is essentially, though not precisely, the same as that described by Galen and Ḥunayn. Its wellspring lies at the forefront of the brain where the two hollow optic nerves take form, the inner sheath arising from the softer *pia mater*, the outer sheath from the harder *dura mater*. Meeting at the optic chiasma (*nervus communis*), they subsequently diverge to reach their respective eyesockets, which they enter through a foramen in the bony hollow. They then expand outward, the outer sheath forming the scleral tunic (*consolidativa*) that encloses most of the eyeball. The transparent anterior portion of this outer tunic forms the cornea. For its part, the inner sheath forms the uveal tunic (Galen's *chiton choroeides*), which encompasses a smaller sphere than the scleral tunic and is attached to the sclera toward the front. The uveal tunic continues

beyond the circle created by the intersection of the sclera and the cornea, but it falls short of completion by the amount occupied by the circular opening of the pupil. Unlike Galen and Ḥunayn, Alhacen makes no mention of the retina.¹⁶⁹

Inside the uveal tunic is the glacial sphere (*glacialis*). The anterior segment of this sphere is filled with glacial humor (Galen's *krystalloiedes*), its posterior segment being filled with vitreous humor (Galen's *hyaloeides*). The space between the glacial sphere and the inner surface of the cornea is filled with albugineous humor (Galen's *ooeides*). The glacial sphere itself is enclosed by an exquisitely thin integument, the *arana* ("cobweb-like"), which allows it to hold its shape while separating it from the elements of the eye that surround it. This integument also extends through the body of the sphere to separate the glacial and vitreous humors. So isolated, the anterior portion of the glacial sphere constitutes the crystalline lens, although Alhacen never refers to it as such, preferring instead the general designation *glacialis*.¹⁷⁰

As an outgrowth of the brain, each eye is linked to it through the hollow optic nerve that originates at its forefront. After crossing with its mate at the optic chiasma, each nerve enters its respective eyesocket where it funnels out to form the two key tunics--sclera and uvea--that enclose the eyeball and the glacial sphere within it. Being hollow (i.e., *obticus*), the optic nerve serves as a conduit for visual spirit, which is passed through it from the brain. Flowing into and through the eye, the visual spirit eventually reaches the anterior portion of the *glacialis* (i.e., the crystalline lens) which it suffuses and, in the process, endows with sensitive power. Like Galen and Ḥunayn, then, Alhacen locates the seat of visual sensitivity in the crystalline lens rather than at the outer surface of the cornea, as seems to be the case for Ptolemy. It is, of course, tempting to identify Alhacen's visual spirit with Galen's *pneuma psychikon*, but it bears noting that, unlike Galen (and Ḥunayn), Alhacen has nothing to say about the ultimate source or production of the visual spirit in the brain. Nor, for that matter, does he ever mention the ventricular structure of the brain.¹⁷¹

Connected to the optic nerve at its rear, the eyeball as a whole is attached at the face by small muscles to each side. Aside from these attachments, the eye floats freely within the eyesocket so that it can move smoothly and swiftly in both a lateral and up-and-down direction at the behest of its guiding muscles. The nerve at the back, for its part, is supple enough to flex easily with such motion so as not to impede it. This capacity to move freely allows the eye to scan the visual field continually and effortlessly, thereby taking it in to the fullest possible extent.¹⁷²

So far, the physical and physiological structure described by Alhacen

accords fairly well with that described by Galen and Hunayn. Yet, when it comes to the eye's geometrical structure, the accord is much poorer. Alhacen agrees that the eyeball as a whole is absolutely spherical, at least at its frontal portion. But he goes on to claim that as an integral part of this greater sphere, the cornea forms a perfect extension of the sclera instead of bulging outward, as Galen (and perhaps Hunayn) would have it. The smaller glacial sphere, he continues, lies inside and somewhat toward the front of the eyeball, so its centerpoint is anterior to that of the eyeball as a whole. However, the front portion of the glacial sphere is flattened in just such a way that its curvature is precisely the same as that of the cornea ahead of it. The anterior surface of the glacial sphere is therefore concentric with the surface of the eyeball as a whole. Its posterior surface, on the other hand, remains eccentric to the eyeball.¹⁷³

The centerpoints of the eyeball and of the uveal sphere are connected by an axial line, which runs straight through the middle of the pupil to the middle of the hollow optic nerve at the back of the eyeball. According to this disposition, every line that is orthogonal to the surface of the cornea will be orthogonal to the anterior surface of the *glacialis* and, on that account, will converge at the center of the eye.¹⁷⁴ Figure 8 represents the geometry of Alhacen's eye as described to this point. The outer circle represents the eyeball, with its center at **A**, the arc to the far right being the cornea. The inner circle, with its flattened anterior surface, represents the glacial sphere. Its centerpoint, overall, is **B**, although its flattened anterior surface shares centerpoint **A** with the cornea. The line running through centerpoints **A** and **B** and continuing to the middle of the optic nerve is the axial line. Since the anterior surface of the glacial

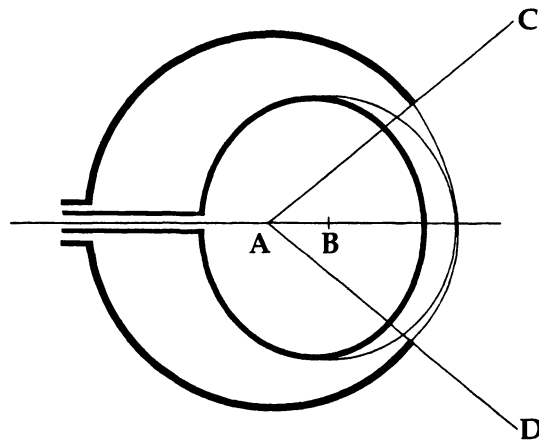


figure 8

sphere is concentric with the surface of the cornea, all of the lines passing orthogonally through those surfaces, as represented by **CA**, **DA**, and axis **AB**, will converge at the center of the eye.

In terms of its geometry, the eye described by Alhacen is significantly different from the eye as we know it now or from the eye as understood by Galen and Ḥunayn. For a start, in supposing the cornea to be perfectly concentric with the eye as a whole, Alhacen dismisses the fact, known to Galen, although perhaps not to Ḥunayn, that the cornea actually bulges outward from the eyeball's surface.¹⁷⁵ For another, in supposing the glacial sphere to be smaller than the ocular sphere enclosing it, Alhacen is forced to leave an unaccountably large space between the two, especially toward the rear. Why make these two counterfactual suppositions? As will become evident in the following subsection, they are absolutely necessary to Alhacen's account of how visual images are selected by the eye. Thus, like Ḥunayn, who locates the lens at the very center of the eye despite clear evidence to the contrary, Alhacen accommodates the structure of the eye to the demands of his theory, rather than the converse. Because the eye, given its visual function, *ought* to be structured in the way Alhacen describes it, then it *must* be structured in that way.¹⁷⁶

Sensation and the Selection of Visual Images: As we saw earlier, Alhacen's model of radiation assumes that every point (or spot) on a luminous, colored surface radiates its form in every direction transparency permits. As a result, the surface of the cornea, and thence the *glacialis* or lens, is bombarded by radiation from all angles, each point on it receiving the form of every point on the facing object, and every point on it receiving the form of each point on that object. Take points **A**, **B**, and **C** on the visible surface represented by line **ABC** in figure 9 on the following page. Each of these points will radiate its form to all points on the surface of the corneal arc between **E** and **F**. Consequently, points **E**, **D**, and **F** on the cornea will receive forms simultaneously from every point on the visible surface. Given this model of indifferent punctiform radiation, how does the eye make coherent sense of such an incoherent battery of visible impressions?¹⁷⁷

Simplicity itself, Alhacen's response is based on the dynamic properties of the ray and the sensitive capacity of the lens. Only those rays that strike the lens orthogonally make an adequately strong impression to be felt by it. The rest, impinging at an angle, are simply ignored because of their relative weakness. Moreover, as a refractive body, the glacial humor allows only the orthogonal rays to pass through unbent; the rest are deflected out of consideration. The lens, therefore, filters the

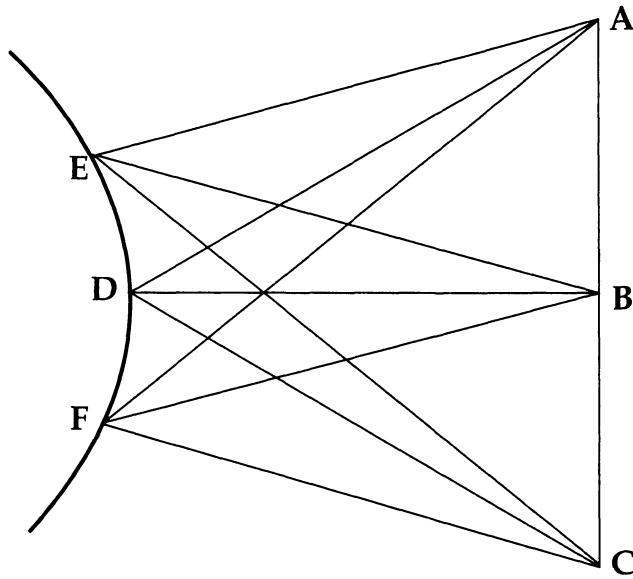


figure 9

chaos of impressions that reach it, selecting only those that form a cone of radiation with its vertex at the centerpoint of the eye and its base at the surface of radiation. Mathematically equivalent to the visual cone of Euclidean-Ptolemaic optics, Alhacen's cone of radiation ensures that the eye will abstract a point-by-point representation of the visible object that takes form as a mosaic of individual color-forms at the anterior surface of the lens

This formal depiction (*forma*) constitutes the visible image, and its ultimate apprehension by the visual faculty depends on its being transmitted in proper order through the eye and the optic nerve to the brain.¹⁷⁸ If the constituent points of the visible form abstracted by the lens were allowed to continue unrefracted through the *glacialis* along the orthogonal rays from which they were initially abstracted, then the form as a whole would be inverted by the crossing of those rays at the center of the eye. Transmitted to the optic nerve in such an inverted order, the resulting image would represent the object upside down, not upright. Yet we see things upright. Therefore, there must be some way to prevent such crossing.¹⁷⁹ Here the interface between glacial and vitreous humors comes into play. Three assumptions are necessary. First of all, that interface must lie ahead of the eye's center so that the rays never intersect. Second, the vitreous humor must be more refractive than the glacial humor. And, finally, the curvature of the interface must be less sharp than that of the anterior surface of the lens. If these conditions are

met, Alhacen concludes, the rays bearing the visible form will never intersect, so the form they convey will be channeled upright and in proper order along the visual axis into the hollow optic nerve. Upon entering the nerve, the visible form will then be conveyed through it in proper order to the optic chiasma, the visual spirit serving as the medium of transmission throughout. It is here, at the optic chiasma, that the images conveyed from both eyes are fused. The resulting unified form is presented to the final sensor (*ultimum sentiens*), whose basic function is to make perceptual sense of it—but more on that later.¹⁸⁰

We must not lose sight of the fact that, according to Alhacen, the selection and transmission of visible forms by the eye involves physiology as well as physics. Indeed, as soon as the impinging color-forms make contact with the surface of the lens, the contact is felt by the lens in the form of pain (*dolor*), which generally goes unnoticed. It can, however, become acute if the impression is too intense, as happens when we stare directly at the sun. Conveyed neurologically to the brain through the visual spirit that infuses the optic complex, this pain alerts us to the fact that we are seeing something (and presumably induces us to attend to what we are seeing). Without the mediation of visual spirit, moreover, visible forms would not be properly channeled through the internal humors of the eye to the optic nerve. Nor, for that matter, would they maintain their proper order as they wound through the optic nerve itself unless the visual spirit pervading the hollow of the nerve forced them to do so. Hence, the physical receptivity of the eye and the optic nerve is complemented by a sensitive receptivity granted them by their charge of visual spirit. Without this double receptivity, the optic complex would be incapable of transmitting the visible form intact to the final sensor.¹⁸¹

Simple Perception: Strictly speaking, Alhacen's eye senses only color and light, and it invariably senses them commingled. Furthermore, it senses only the fact, not the quality or type, of the color and light impinging upon it. The eye makes no judgment whatever about the color and light it senses. Less strictly speaking, Alhacen acknowledges that we see a total of twenty-two visible characteristics or "intentions" (*intentiones*) possessed by physical objects. Two of these intentions, light and color, are *per se* visible—or, in Aristotelian terms, they constitute the proper object of sight. The remaining twenty are mediately visible in that they derive from the primal apprehension of light and color that arises from brute sensation (*solo sensu*). In order of Alhacen's analysis, they are as follows: distance (*remotio*), spatial disposition (*situs*), corporeity (*corporeitas*), shape (*figura*), size (*magnitudo*), continuity

(*continuitas*), discontinuity or separation (*discretio vel separatio*), number (*numerus*), motion (*motus*), rest (*quies*), roughness (*asperitas*), smoothness (*lenitas*), transparency (*diafonitas*), opacity (*spissitudo*), shadow (*umbra*), darkness (*obscuritas*), beauty (*pulcritudo*), ugliness (*turpitudine*), similarity (*consimilitudo*), and difference (*diversitas*).¹⁸²

That we do not actually “see” these intentions is obvious, given that the visible color-form presented to the final sensor provides the sole basis for visual perception. Being merely representational, that form does not possess the actual physical qualities—such as size, corporeity, or beauty—of the object it represents. After all, as presented to the final sensor at the optic chiasma, the visible form of a six-foot-tall man cannot itself be six feet tall, nor can it have his corporeal bulk, his spatial disposition, or any of his other objective qualities. Such qualities must therefore be implicit, not explicit, in the visible form. Consequently, the final sensor must somehow infer them. This it accomplishes through the faculty of discrimination (*virtus distinctiva*), which enables it to distinguish among the various visible intentions and to determine them perceptually.¹⁸³

The process of discrimination is essentially inferential or deductive (*sillogistica*) and usually involves comparison or correlation (*comparatio*). Take the perception of transparency as an example. That we have no direct visual access to it is evident, since transparency is, by definition, the absence of opacity. Our perception of transparency must therefore be mediate—i.e., in relation to other perceptions. Consequently, when we see a given object and perceive its remoteness from us, we deduce that the air-filled space between it and us is transparent. This holds even in the case of diaphanous bodies, such as translucent gems, whose color or consistency (*spissitudo*) renders them actually visible. For as soon as we see a light-source or illuminated body shining through them, we perceive their transparency. So, too, corporeity is perceived not in itself but by inference from the fact, known through repeated experience, that the light and color we see originate from surfaces. Experience also teaches us that surfaces are embodied. Thus, at the moment we see something, we automatically deduce that it is corporeal.¹⁸⁴

Although by Alhacen’s account we are all naturally endowed with the capacity to discriminate and deduce, we are otherwise *tabulae rasae* at birth, possessing no innate notions of “red” or “triangle” according to which we might pigeonhole our sensations or perceptions as they occur to us. Such notions are learned, formed through repeated experience of the given quality along with repeated realizations that this particular quality is not some other, such as green or yellow. So learned and generalized, these notions are eventually committed to memory—or, to use

Alhacen's own phrasing, they are "ensconced in the soul" (*quieverunt in anima*). In that form they are subject to recall in the imagination. Hence, repeated experiences of red or triangular things eventually yield the notions of redness or triangularity by virtue of which we recognize subsequent instances of redness or triangularity.¹⁸⁵

Alhacen's account of distance- and size-perception is particularly instructive as an example of the experiential and deductive nature of visual perception. Now, according to Alhacen, distance, or remoteness (*remotio*), can be understood in two ways: as the *fact* of remoteness (i.e., the outwardness of external objects) or as the *amount* of remoteness (i.e., how far those objects lie away from us). Let us start with the fact of remoteness.¹⁸⁶ At first blush our perception of the outwardness of external objects might strike us as absolutely intuitive, a natural and immediate concomitant of the visual act itself. According to Alhacen, however, this perception involves a deductive process that starts with the recognition that objects disappear from sight when the eye turns away or when the eyelids are closed. "Now it is intuitively obvious" (*Et in natura intellectus est*), Alhacen concludes from this,

... that what affects the eye in a given situation but disappears when it is removed is not fixed in the eye. . . . It is also intuitively obvious that what appears when the eyelids are opened and disappears when they are closed is not fixed in the eye, nor does the thing creating this effect lie within the eye. Now when the faculty of discrimination perceives that the effect occurring in the eye . . . is not something fixed within the eye, nor is the thing creating that effect within the eye, then it immediately perceives that what occurs in the eye comes from outside And when the faculty of discrimination perceives that what is seen neither lies within the eye nor is placed directly upon the eye, it immediately perceives that there is distance between that thing and the eye.¹⁸⁷

In contrast to Ptolemy's account, in which the very outward reach of the rays to external objects informs us immediately of their outwardness, Alhacen's account emphasizes the mediate and inferential nature of such information.¹⁸⁸

Not surprisingly, the process by which we perceive the amount of distance is considerably more involved than that by which we perceive mere outwardness. First, we must establish some basic gauge. We do so according to the measure of our own bodies, in terms of arms-lengths or paces. On that basis, we begin by determining distances that are near us, for example a pace-length's distance from where we are standing. We then extend that measure outward, pace-length by pace-length, un-

til we get a determinate sense of intermediate distances in terms of multiple pace-lengths. Through constant repetition, we eventually come to recognize such measures unconsciously, a fact that misleads us into thinking we determine them immediately and intuitively. But there is a limit to our ability to perceive, and therefore to determine, distances in this way. In order to gauge longer distances, we must have convenient landmarks along the way, or, as Alhacen puts it, there must be “a continuous, ordered range of bodies” (*corpora ordinata continuata*) spanning the distance to be measured. More often than not, this span consists of determinate portions of the ground lying between the eye and the object, but a range of uniformly disposed objects, such as trees, along the line-of-sight will do as well. Staked out in this way, moderately large eye-to-object distances can be perceptually determined with fairly high accuracy. Vast distances without intermediate landmarks (celestial distances, for example) can only be estimated, and such estimation is naturally subject to error, often significant error.¹⁸⁹

As is clear from this analysis, distance- and size-perception are inextricably linked, because our ability to perceive long distances determinately depends upon our recognition of landmarks, such as trees or houses ranged along the way. Yet, without some grasp of the size of those landmarks, we cannot accurately correlate them to the distances at which they lie. The perception of size therefore depends in great part upon the perception of distance. It starts with the perception of how much of the visual field, and thus its projection upon the surface of the lens, is occupied by the object under scrutiny. With that determined, Alhacen continues, we can imagine the visual angle subtended by the object itself. Then, if we have a determinate sense of how far away the object is, we can correlate that distance to the imagined angle in order to arrive at a determination of size. Altogether, then, size-perception depends upon a threefold correlation among: (1) the relative extent of the portion of the visual field occupied by the object, (2) the size of the imagined visual angle subtended by that portion, and (3) the distance that is perceived between eye and object.¹⁹⁰

Increasing familiarity with specific distances and objects leads not only to their automatic recognition, but also to an almost automatic determination of the object's size as correlated to such distances. Hence, once the general notion of a given size—e.g., that of a man or a horse—is committed to memory, we will almost invariably perceive such objects to be the same size no matter the distance or the variation in visual angle that comes with it, at least within reasonable limits. That is why, if we place our hand directly in front of our eyes, we immediately realize that it is far smaller than the distant wall it occludes, even though the

visual angle it subtends is greater. Alhacen, in short, is well aware of the size-distance invariance principle.¹⁹¹

Compared with Ptolemy's account of distance- and size-perception, Alhacen's might, at first glance, appear unduly complex, even unwieldy. But Ptolemy had one signal advantage over Alhacen. He could explain the perception of outwardness, as well as of distance, in terms of a virtually immediate apprehension of both according to our supposedly innate sense of the outward reach and length of the mediating ray. Size-perception follows almost automatically, depending as it does upon the correlation of visual angle and distance.¹⁹² In rejecting the visual-ray theory out of hand, though, Alhacen left himself no option but to reject the quasi-immediatist explanation of distance- and size-perception that is based upon it. After all, in reaching to the eye from outside, Alhacen's ray provides an objective rather than a subjective perspective on things. Unable, therefore, to appeal to the self-referential radiation of Euclid and Ptolemy, Alhacen had to take an entirely different tack. Given this imperative, the resulting inferential account of distance- and size-perception is as reasonable as it is bold. More to the point, it is, as far as we know, one of the few truly original parts of Alhacen's general theory of visual perception.

Equally striking, though less original, is Alhacen's account of aesthetics. It, too, is inferential, insofar as it depends upon correlations. However, while Alhacen's approach to aesthetics is relational, it is not relativistic.¹⁹³ Beauty is not in the eye of the beholder for Alhacen; it is in the object that possesses it. By virtue of its light, for instance, the full moon is inherently beautiful, as is a rose by virtue of its color, or a silken fabric by virtue of its smoothness. Indeed, all of the visible intentions can, in one way or another, confer beauty upon things. The very size of the moon, Alhacen points out by way of example, makes it inherently more beautiful than a star, a large star being more beautiful than a smaller one by virtue of its greater size. For the most part, however, beauty depends upon a combination of characteristics and their interrelationships. That is why a large star, given both its luminosity and its size, is more beautiful than a smaller one, whose diminished size detracts from the inherent beauty of its luminosity. Likewise, an almond-shaped eye of moderate size is more beautiful than an almond-shaped eye of immoderately large or small size. Even two things that are intrinsically beautiful in their own right can combine to create ugliness. An almond-shaped eye of moderate size but of a rose-red color, for example, would be exquisitely ugly. And, to draw upon an example from the Arabic version of the text, so would the combination of blond hair and blue eyes.¹⁹⁴

The relational emphasis of Alhacen's aesthetics becomes crystal-clear in his discussion of harmony or proportion as an overarching principle of beauty. Indeed, almost all aesthetic judgments are based upon this principle, for, as Alhacen concludes, "when you examine the beautiful forms of every kind of visible object, you will find that proportionality creates beauty more than any other characteristic on its own or, for that matter, any conjunction [of characteristics] on its own."¹⁹⁵ To illustrate, Alhacen offers the example of a face and the composition of its members. Accordingly,

. . . large eyes having a beautiful shape, along with a moderately flat nose whose size is proportionate to that of the eyes, are beautiful. So, too, even if they are small, eyes of an almond shape, having a charming and delicate shape, will be beautiful when they occur along with a narrow nose of moderate shape and size. Likewise, slim lips along with a delicate mouth are beautiful when the delicacy of the mouth is proportionate to the slimness of the lips—i.e., when the lips are not inordinately slim, nor the mouth inordinately small, but the mouth must be moderately small while the lips are slim and, moreover, proportionate to the size of the mouth. So, too, when the width of the face is proportionate to the size of the facial members, it will be beautiful—i.e., when the face is not inordinately broad, and when the facial members are proportionate [in size] to the size of the whole face. For when the face is inordinately broad, but its members are too small to be proportionate in size to it, the face will not be beautiful, even though the size of the members may be proportionate [among each other], and even though they are beautifully shaped.¹⁹⁶

Conversely, Alhacen concludes, "if the members are proportionate among each other as well as to the breadth of the face, the form will be beautiful, even if the members are not beautiful by themselves."¹⁹⁷ In other words, proportion or harmony overrides every other aesthetic consideration in the final judgment of beauty or ugliness.¹⁹⁸

There is little or nothing really new or remarkable in this account of aesthetics. For one thing, the emphasis upon harmony or proportionality is essentially Greek in origin.¹⁹⁹ For another, by stressing the objective nature of beauty over its subjective appreciation, Alhacen ignores psychological or cultural factors that obviously do influence aesthetic judgments. After all, as Shakespeare observes with such poignancy in sonnet CXXX, love can pervert aesthetic judgment beyond reasonable measure.²⁰⁰ Moreover, Ibn al-Haytham's judgment that blue eyes and blond hair are ugly is culturally, not objectively, determined. What is,

or at least seems to be, new in Alhacen's aesthetic analysis is the analysis itself. For with Alhacen we have the first known effort to subject aesthetics to a relatively full and systematic scrutiny in the broader context of visual theory.

We need spend little time discussing the remaining visible intentions beyond making the following observations. First, many of them are naturally paired, one positive, the other negative (e.g., opacity vs transparency, continuity vs discontinuity, motion vs rest, roughness vs smoothness, similarity vs difference). To perceive the negative (e.g., transparency) is therefore to perceive that it is not the positive (i.e., opacity).²⁰¹ Second, these intentions, and their perceptions, tend to be interlinked. Similarity, for instance, must be similarity in virtue of something else, such as shape, color, size, or the like. And, finally, all of the visible intentions are inferred through correlation. Thus, to take lateral motion as an example, it is deduced from a correlation of the moving object with its changing spatial dispositions *vis-à-vis* surrounding objects.²⁰²

Certification and the Perception of Individuals and Types: No visible intention is ever perceived in isolation, because no object is defined by a single visible attribute. The moon, by way of example, is initially perceived in terms not just of its light, but of its circularity, its corporeity, its disposition in the night sky, and its relative immobility. When we perceive any object through sight, then, we perceive it according to the totality of the visible features that define it. Only after sight has perceived that totality does the faculty of discrimination isolate the object's individual features analytically. With familiar objects, such as the moon, we do not need to consider all of their visible features in order to perceive them as such. A few of the more salient ones will do. With unfamiliar objects, on the other hand, we need to take a fuller accounting if we are to pigeonhole them satisfactorily. This full accounting, which constitutes what Alhacen calls "accurate determination" or "certification" (*certificatio*), results from a close, definitive visual scrutiny (*intuitio*).²⁰³

The accuracy of this scrutiny depends upon several factors, the first of which is visual acuity. Since the eye is naturally disposed to see most clearly and accurately along the axial line, then the farther away from that axial line a given line-of-sight falls within the cone of radiation, the weaker and more indefinite the visual impression along it. Consequently, that portion of the object that is viewed directly along, or in close proximity to, the axial ray will be perceived most definitely and accurately. In addition, since vision is generally binocular, and since the eyes are naturally disposed to work in concert, the clearest, most accurate visual

impression under normal circumstances will be of that spot on the object-surface that is intersected by the two visual axes.²⁰⁴

The spatial disposition (*situs*), or orientation, of the object is yet another factor. An object will be most accurately perceived when it faces the eye directly (*in directam oppositionem*) so that the so-called common axis is perpendicular to the object's surface at roughly the midpoint and, in addition, so that the two visual axes intersect at that same point.²⁰⁵ Now the common axis, according to Alhacen, is the perpendicular line that bisects the line connecting the midpoints of the openings in the eyesockets where the optic nerves enter.²⁰⁶ To illustrate, let the circles centered on **A** and **B** in figure 10 represent the two eyeballs. Let **D** and **E** be the midpoints of the openings in the eyesockets where the two optic nerves enter, and let **DC** and **EC** represent the continuation of these nerves toward the brain. Point **C**, where they cross, thus represents the optic chiasma, or "common nerve." Finally, let the two visual axes, **AG** and **BG** focus at midpoint **G** on the object's surface. Accordingly, line **CFG**, which bisects **DE** and is perpendicular to it, as well as to the surface of the object at its midpoint, represents the common axis.²⁰⁷ If this

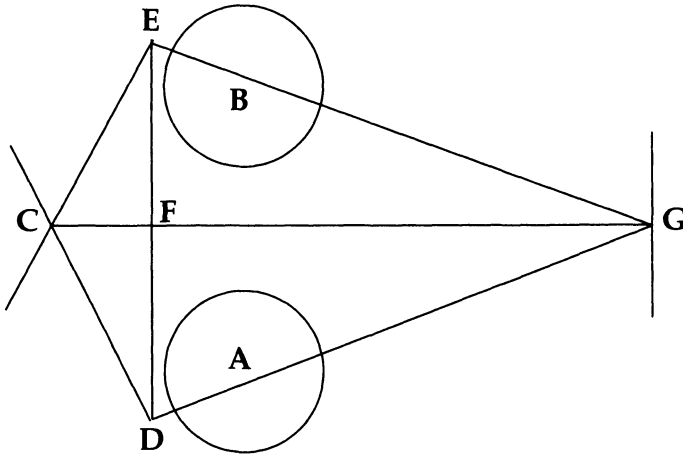


figure 10

axis fails to intersect the object-surface at its midpoint, or if it fails to intersect the object-surface at all, or if the object-surface is slanted with respect to it, then, even though the two visual axes may intersect upon the object-surface, it will be perceived less clearly and accurately than it would be under a directly facing disposition. The farther from the common axis the object-surface's midpoint lies, the less clearly and accurately that object will be perceived.²⁰⁸

Granted these conditions, the process of certification involves, first,

turning the head and eyes so as to bring the three axes to bear as closely as possible upon the midpoint of the object-surface under scrutiny and then scanning it as thoroughly as possible by passing the two eyes over every cross-section (*diameter*) of it. Each time the eyes take in a clear and accurate impression of the spot where the three axes intersect on the object's surface, they also take in a less clear, but more general, impression of the object as a whole. Thus, at each reprise, the object is perceived according to both part and whole. Once the scan is complete and the object has been definitively perceived according to as many of its visible characteristics as possible, the resulting form is committed to memory. The more often the object is scrutinized, the more definite and firmly planted its form becomes in memory, much as a speech is learned by heart through continual rehearsal.²⁰⁹

The ultimate goal of vision is not to determine the visible features of things as accurately as possible, though. It is to establish what those things are by means of the visible features that define them. This we do primarily through correlation and assimilation (*assimilatio*), by which Alhacen means the process of matching a given visible form to its closest notional exemplar in memory.²¹⁰ For instance, when I see a color I have never seen before, I scrutinize it carefully and, while doing so, attempt to find its closest notional counterpart in memory. Ultimately, I will correlate it to that notional counterpart, and, having thus found a perceptual niche for it, I will memorize it for subsequent recall in case I ever see its like again. The more often I see such a color, the more definite and memorable its notional representation becomes.²¹¹

With repeated perceptual experiences we acquire a vast array of notional representations in memory. These representations exist at two basic levels. The most general level is that of the universal form (*forma universalis*), which represents things by type or kind (*quiditas*). Repeated experiences of individual humans or horses eventually yield a universal form of "human" or "horse" that is a sort of confused composite of each specific instance. As such, it represents its object according to a limited set of defining features that are common to all, or at least the vast majority, of its specific instances. The universal form of "human," for example, should include such general features as uprightness of posture, a certain configuration of members, and a certain size. Specific features, such as eye-color or complexion, should not be included. Those belong by rights to the the second sort of form, the individual form (*forma individuorum*). This form, of course, is specific to particular instances, so it is through the individual form that I remember my old friend Martin, with his flaming-red hair, rubicund face, and upturned nose. I might even remember him according to specific circumstances, such as the place

and time I first met him.²¹² Memory and recognition thus play a crucial role in how we make sense of what we see, according either to general type or to specific individual. For it is by correlating the appropriate notional form ensconced in memory to whatever form we are seeing at the time, that we determine what that visible form actually represents.

As we have already noted, the visible form presented to the final sensor represents its object in its totality, as both type and individual, according to all of the object's visible intentions. Theoretically then, if we are to determine what it represents, we must go through the process of certification, scanning the object completely and correlating it feature by feature to its notional counterparts in memory. But that would be inordinately time-consuming and laborious. More often than not, we save ourselves the trouble by making perceptual determinations on the basis of key defining features, or "signs" (*signa*). That way we recognize things on the spur of the moment without having to peruse them at length.²¹³

This sort of visual apprehension is, in Alhacen's parlance, "vision at first glance" (*visio in primo aspectu*), and it can occur along with recognition (*cum cognitione precedente*) or without it (*fantastica*). In either case, it is limited to the most obvious features (*intentiones manifeste*) of the object seen. Without the correlative process of recognition, it constitutes a mere passing glance that yields the most indefinite of perceptual impressions. With the correlative process of recognition, such a glancing scrutiny enables us to make perceptual sense of things with minimal effort. Thus, when I note the bipedal stance of a given object and take this stance as a "sign," I immediately perceive that object as human. However, what vision at first glance makes up for in ease and temporal efficiency, it loses in certitude. The human I just thought I saw may turn out, on closer inspection, to be an ape. To perceive as accurately as possible, therefore, we must subject what we see to the close visual scrutiny (*intuitio*) that yields certification. Like vision at first glance, close visual scrutiny can occur along with recognition or without it.²¹⁴

All perceptual determinations, no matter how cursory, require time, and the more complete and complex the determination, the greater the time required. Perceptual determinations that occur along with recognition, however, take less time than those that do not. Hence, we perceptually determine familiar objects more quickly than we do unfamiliar ones, because we do not need to scrutinize familiar objects as carefully to identify them, having their notional representations as firmly planted in memory as we do. By the same token, when we see familiar objects, we perceive their universal forms sooner than we do their individual forms, because we need to consider fewer defining features for

such a determination. Thus, when I see my good friend Martin, I perceive him as human before I perceive him as Martin, the key defining features of his type, humanity, being fewer and more manifest than those of his personal individuality. The most time-consuming and difficult perceptual determination of all involves objects, such as mules and horses, or identical twins, that closely resemble one another. Hence, the more subtle the key differentiating features, the more extensive and intensive the visual scrutiny must be if they are to be accurately perceived and noted.²¹⁵

It should be clear by now that, specific details aside, the account of perception just described links Alhacen fairly closely at the conceptual level with both Aristotle and Ptolemy. There is fundamental agreement among all three that vision unfolds in stages, starting with the primal sensation of color (Aristotle's "proper object," Ptolemy's "primary visible," Alhacen's "brute sensible"). All three find in the resulting sense-impression the basis for subsequent perceptions of ulterior features—many of them spatial—that are implicitly conveyed by the initial sense-impression (Aristotle's "common sensibles," Ptolemy's "secondary visibles," Alhacen's "visible intentions"). The result, at least for Alhacen and Aristotle, is a perceptible representation of the object that, in turn, gives rise to a conceptual representation according to individual ("Diores' son" for Aristotle, "Martin" for Alhacen) or type (the "universal" for Aristotle, the "universal form" for Alhacen).²¹⁶

Moreover, there are several indications in Alhacen's account that it was informed, at least to some extent, by the model of Aristotelian faculties-psychology developed by his Arabic predecessors.²¹⁷ For a start, Alhacen breaks the perceptual process down into a hierarchical order, starting at the bottom with brute sensation (*comprehensio solo sensu*), passing upward to perception proper (i.e., of particular intentions), and culminating with apperception (i.e., of individual and universal forms). Furthermore, Alhacen more or less explicitly locates the perceptual process in the brain, where the soul (*anima*) has ultimate control over it.²¹⁸ In addition, Alhacen's visual spirit is a cerebral agent, serving as material support for the formal entities that are central not only to perception, but to apperception. Furthermore, although he usually attributes perceptual and apperceptual functions *grosso modo* to the soul (*anima*), Alhacen makes occasional mention of specific faculties within the soul. Most often cited is the final sensor, which functions in much the same way as the Aristotelian common sense. Like the common sense, moreover, it seems to be located toward the front of the brain, where it can be in close communication with its proper object—the visible form—at the optic chiasma.²¹⁹ Alhacen also refers explicitly to the imagination

(*ymaginatio*) as the place where the forms abstracted by the final sensor are delineated, or impressed (*figuntur*), and eventually stored for recall during correlation and assimilation.²²⁰ Finally, Alhacen emphasizes not only the psychological, but also the epistemological foundations of visual perception. In many respects seeing is knowing for Alhacen, entailing the same sorts of syllogistic associations and culminating in the same sorts of conclusive realizations.²²¹

Visual Illusions: Some pages back we observed that, like Ptolemy, Alhacen divides the science of optics under three heads according to the three basic modes of vision: *optics* proper, which is the study of sight by unbroken rays; *catoptrics*, which is the study of sight by reflected rays; and *dioptrics*, which is the study of sight by refracted rays. We also observed that, by both Ptolemy's and Alhacen's lights, these latter two types of vision (i.e., reflected and refracted) are inherently deceptive inasmuch as they distort our perception of the actual place, and sometimes of the proper shape and size, of things. Since the subject of books 1-3 of the *De aspectibus* is *optics* proper, we will ignore the other two modes of vision and concentrate on the illusions that arise in the case of vision by unimpeded radiation, or, as Alhacen phrases it, "direct vision" (*visus directus*).²²²

The point was made toward the beginning of this overview that, according to Alhacen, eight preconditions must be met if sight is to occur at all (see p. liii above). Furthermore, we pointed out that these preconditions are normative, that if each and every one of them falls within an appropriate range, the ensuing visual perception will be veridical.²²³ Hence, if the object is of appreciable size and opacity, and if it lies at an appropriate distance in front of the eye for an adequate amount of time, then as long as the light is right, the ambient air clear, and the eye healthy, that object will be correctly perceived. On the other hand, if any one or more of these conditions falls outside the appropriate range—e.g., if the light is too poor, the ambient air too hazy, or the eye unsound—the object will be misperceived. Such misperceptions can range in severity, from gross (e.g., mistaking a dog for a cow) to mild (e.g., mistaking a slightly warped plank for a straight one). All visual illusions can be reduced to misperceptions of this sort.

Alhacen opens his discussion with an examination of diplopia, or double vision. The first point he establishes is that *all* binocular vision, even under optimal conditions, is diplopic to some extent. To convince us, he invites us to consider the situation in which an object faces the eye directly, so that the common axis and the two visual axes converge dead center upon its facing surface. By way of illustration, let the two

circles centered on **A** and **B** in figure 11 represent the eyes, **HK** the visible object, **F** the midpoint of its facing surface, and **XY** the line connecting the midpoints of the openings in the eyesockets where the nerves enter. Thus, **ZF**, which falls orthogonally to **XY** and bisects it, represents the common axis. Under the specified conditions **ZF** also falls orthogonally to point **F**. Finally, let the two visual axes, **AF** and **BF**, converge upon the common axis at point **F**. Accordingly, the form of point **F** will reach the two eyes at points **C1** and **C2**, which lie precisely at the midpoints of the corneas. Their respective locations on the cornea will thus correspond as perfectly as possible (*erunt magis consimiles*). That being so, when the two forms impressed at those locations reach the optic chiasma to be fused, they will overlap as perfectly as possible.

Meanwhile, the form of point **G** will reach points **D1** and **D2** on the two corneas. In this case the locations of the two points do not correspond perfectly. **D1** will lie somewhat closer to **C1** than will **D2** to **C2**, because angle **FBG** is slightly smaller than angle **FAG**. Therefore, when the forms at **D1** and **D2** reach the optic chiasma to be fused, they will not overlap as perfectly as possible because of the disparity in their re-

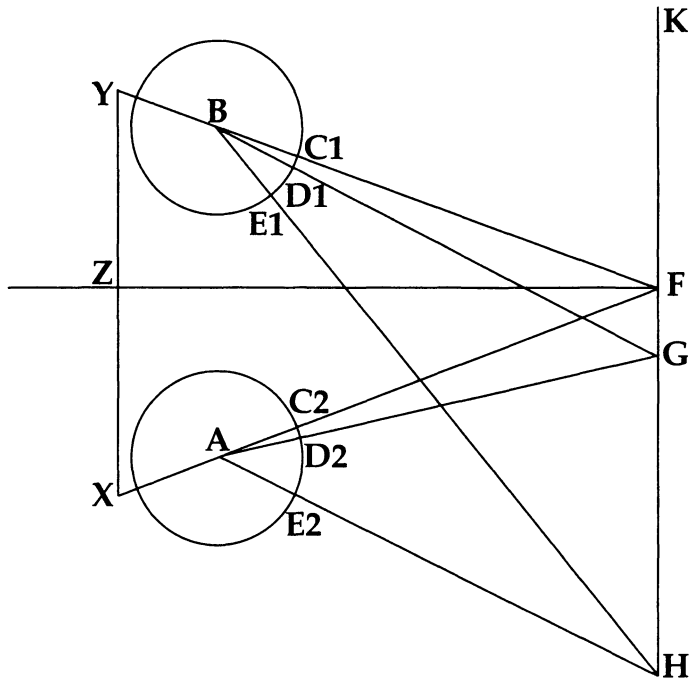


figure 11

spective locations. In reality, though, these forms are not mathematical points; they exist as tiny spots both upon the corneal surface and within

the optic chiasma. Hence, although they may not overlap perfectly, they will do so to such an overwhelming extent that the disparity in their locations after fusion goes almost unnoticed, the only perceptible effect being a slight blurring or indefiniteness of the resulting image. Not so with point **H**, which lies far to the side of **F**. Its form is projected upon points **E1** and **E2** of the respective corneas, but those two points lie at significantly different distances from **C1** and **C2**, because angle **FBH** is appreciably smaller than angle **FAH**. Consequently, when the forms at **E1** and **E2** reach the optic chiasma for fusion, they will fail to overlap entirely. They will therefore be perceived double rather than single.²²⁴

As this analysis indicates, of all the points on segment **FH** of the object's surface, point **F** will be perceived most clearly and definitely because the fusion of its two forms at the optic chiasma will be virtually perfect. The farther to the side of **F** the point that is perceived lies, the more imperfect the fusion and, therefore, the more indefinite the perceptual impression until, finally, indefiniteness yields to diplopia. The same holds, to some extent, for perception along the visual axes when they intersect at a point to the side of the common axis. Thus, if **AH** and **BH** in figure 11 are taken to represent the two visual axes, then even though the form of **H** will be impressed at perfectly corresponding locations on the corneas and will, in turn, be perfectly fused at the optic chiasma, **H** will appear less definite than **F** did with all three axes converging upon it. The primary reason is that, in focusing on lateral portions of the surface, we are viewing them at a slant. As a result, we cannot discern the minute details of that portion of the surface as clearly as we can when we look at it face-on.²²⁵ That is why, when we want to scrutinize something as clearly and carefully as possible, we try to bring all three axes to bear upon it. Suffice to say, nothing seen at the intersection of the two visual axes, no matter how far to the side of the common axis, will ever appear double.

Normally, of course, we do not see double, even at the lateral fringes of the visual field. Why we do not is due to a combination of factors. First, in almost all cases, the effective portion of the visual field is narrow enough that the forms of objects viewed within it will occupy locations on the eye that correspond closely enough not to cause diplopia. Furthermore, since each spot-form on the lens' surface constitutes part of a continuum of spot-forms, we tend to perceive their continuity in favor of their discontinuity. Thus, even when the given form is projected double in the optic chiasma, its two images are perceptually melded, so that what is perceived is not a double image but an inordinately blurred or indefinite one. In addition, the natural weakness of monocular vision toward the lateral edges of each visual cone renders

objects at or near those edges so indistinct as to be almost beyond perceptual notice. Add to that the diplopic effect of binocular vision, and our failure to notice, much less discern, things lying far to the edges of the visual field becomes all the more understandable. Finally, our natural tendency to scan the visual field rather than simply take it in as a whole gives us a more-or-less unified perception that overrides whatever diplopic effect is created by any single snapshot-glance at that field²²⁶

True diplopia—i.e., a clearly recognized doubling of images—occurs when the object's spatial disposition (*situs*) with respect to the axes surpasses normal limits. If, for instance, I focus on a relatively distant point and then place my finger directly before my nose, my finger will appear double. So too, if I focus on a relatively near point and place my finger directly behind and at some distance from it, my finger will appear double. And, finally, if I focus on a point straight ahead and place my finger relatively close to my face but in line with only one of the visual axes, or to either side of both axes, my finger will appear double. In all of these cases, the underlying reason for the doubling is the displacement of the object from the natural axial focus of the eyes. The more acute that displacement, the more pronounced the doubling.²²⁷

Having analyzed diplopia in all its aspects, whether inherent or forced, Alhacen concludes his discussion by offering a series of experimental verifications of the phenomena described. The apparatus for these experiments consists of a plaque that is roughly a foot-and-a-half long and four inches wide, this latter distance corresponding roughly to the separation between the midpoints of the pupils when the eyes stare straight ahead. A notch is cut for the nose at one end of the plaque so that the plaque can be nested against the face with its outer corners nearly touching the eyes. Diagonals are inscribed from corner to corner on the face of the plaque, and two lines are drawn through the plaque's centerpoint, where the diagonals intersect. One of these lines is drawn across the width and parallel to the top and bottom edges, the other lengthwise and parallel to the edges along the sides. Placing this apparatus up to the eyes, we can then position various objects, such as wax pegs or small strips of parchment, at various points on or beyond its face in order to validate the descriptive account given earlier. The actual experiments need not detain us, since most of them are as simple as they are obvious.²²⁸

Diplopia illustrates how objects can be misperceived when one of the eight preconditions for sight—spatial disposition, in this case—transgresses its normative limits. Indeed, all of these preconditions have normative limits which, if transgressed, will lead to misperception. If the illumination is too bright or too dim, a given object may not be properly

perceived, but between the prohibitive extremes there is a range of light-intensities according to which the object will be properly perceived. Likewise, if an object is too distant or too near, if it is too large or too small, if it is inadequately opaque, or if it is snatched away too soon, it may not be properly perceived. However, as Alhacen is quick to point out, the normative limits of these preconditions are interdependent. A small object may be misperceived at a distance, or under lighting conditions, or during a limited time-interval, in which a larger one would be properly perceived. Thus, the normative range for any of the eight preconditions is relative, each range being proportionate to some or all of the others.²²⁹ In this regard, Alhacen's account of visual illusions is much like his account of aesthetics, which is governed by the proportionality of the elements that arouse the perception of beauty.

Visual illusions occur at three basic levels, according to Alhacen. The first and lowest of these involves brute sensation. At this level the misperception reduces to no perception whatever. An object may be too distant, too far off to the side, too small, too short-lived, too dim, or too tenuous to be seen at all. Or the eye may be too weak to see it.²³⁰ The second level of illusion involves misrecognition. Accordingly, if the conditions are not right (e.g., if the light is inadequate or the time of scrutiny too brief), then we can easily mistake one individual or type for another. Perceiving Peter to be Martin or mistaking a horse for a mule are obvious examples.²³¹ The final level of illusion involves deduction. Alhacen subjects this sort of misperception to an exhaustive analysis, showing how, as each of the eight preconditions falls out of its normative range, we can be led to misperceive each of the twenty-two visible intentions. If, for example, an object lies too far away or too close, we can misperceive its proper distance from other objects, or its shape, or its size, and so forth. And the same holds if the light is too bright or too dim, the air too hazy, or the object too slanted, or too far to the edge of the visual field.²³²

Alhacen's account of visual illusions (and here I limit my remarks to the Latin text only) strikes me as the least compelling portion of his entire theory of visual perception, in part because, by overemphasizing objective causation, it underplays subjective factors, and in part because it is too rigidly confined within its analytic framework. For every impropriety in a given precondition, there must be a corresponding impropriety in our perception of each visible intention. The resulting case-by-case analysis often reads like a litany, repeated *pro forma* for the sake of systematic completeness rather than for the sake of theoretical import. This is not to say that the analysis is an outright failure, only that it is failure relative to the more original and inspired portions of Alhacen's

overall theory of vision (e.g., his account of image-selection at the surface of the lens or his analysis of distance- and size-perception). There is, however, at least one bright spot in Alhacen's analysis of illusions: his account of the diplopic tendency of binocular vision. For, granted the theoretical constraints under which he framed it, his account is remarkably astute in explaining both why and how perceptual acuity varies within the visual field.

As to possible sources for Alhacen's account of visual illusions, the most obvious is Ptolemy. Alhacen's approach to the problem of true diplopia, for instance, is Ptolemaic to the core, and, in fact, he adds little or nothing to what Ptolemy has to say on the subject. Also, Alhacen's categorization of visual illusions according to perceptual level (i.e., brute sensation, recognition, and deduction) is strongly reminiscent of Ptolemy's threefold categorization according to undue physical conditions, anomalies in the visual faculty itself, and interpretive or inferential misperceptions.²³³ Still, Alhacen's analysis differs markedly in tenor and purport from that of Ptolemy. Not only is it more exhaustive and systematic, but it is organized in a fundamentally different way. Thus, while there is little or no doubt that Alhacen drew upon Ptolemy in his analysis of illusions, the extent to which he did so is far from clear. Equally unclear is how much of the non-Ptolemaic remainder of Alhacen's analysis is original, and how much of it is rooted in earlier sources, particularly those falling within the skeptical traditions of Greek philosophy and Islamic theology.²³⁴

Conclusion: As I remarked earlier, no mere survey can do justice to the remarkable subtlety, complexity, and elegance of Ibn al-Haytham's account of visual perception in the first three books of the *Kitab al-Manazir*.²³⁵ The best I can hope for is to have distilled that account, insofar as possible, to its essence. In the process, I have adverted to various points of convergence, at both the conceptual level and the level of specific ideas, between Ibn al-Haytham and his core sources in optics, anatomy and physiology, and natural philosophy. I have also noted that such convergences may be more apparent than real, a matter of coincidence rather than of essential linkage. Especially problematic in this regard are the conceptual convergences that seem to place Ibn al-Haytham within the Peripatetic tradition of physics and psychology. That Ibn al-Haytham's account of radiation may have been informed to some extent by Aristotle's theory of physical causation seems clear enough. No less clear is that, in framing his account of perceptual and apperceptual functions, Ibn al-Haytham may have been drawing upon the Galenized model of Aristotelian faculties-psychology that was developed during

late antiquity and the early Arabic Middle Ages. This model, as we have seen, located such faculties within the brain according to a succession of functions, ranging in hierarchical order from mere sense-perception to true cognition.

The problem is that whatever traces of Aristotelianism we may find in Ibn al-Haytham's account are implicit, not overt. We noted earlier, for instance, that Ibn al-Haytham makes no mention whatever of the ventricular structure of the brain, much less associating specific perceptual or apperceptual functions with specific ventricles. Hence, without explicit evidence, any claims we might make about the influence of Aristotelianism upon Ibn al-Haytham will perforce be tentative. Still, to deny such influence categorically would be rash. For one thing, Ibn al-Haytham's approach to optics tends to be phenomenal rather than theoretical. Consequently, his failure to articulate theoretical principles more sharply and explicitly indicates not so much that he lacked such principles as that his concern with them was tangential. Much like Newton, then, Ibn al-Haytham saw no reason to "feign" hypotheses unnecessarily when his analytic focus was so sharply directed to the phenomenal level. It is difficult to believe, moreover, that Ibn al-Haytham, with his lively mind and wide-ranging interests, would have been impervious to the intellectual currents, Peripatetic or otherwise, of his day. To deny any Aristotelian influences upon his optical thought would therefore be, quite literally, to take that thought out of context.

When we turn from Aristotle to Galen, we are on considerably firmer ground in the assessment of influence. Ibn al-Haytham's description of the anatomy and physiology of the eye—with its cerebral origins, its neurological pathway, its several tunics, its succession of humors, its charge of spirit, its sense-specific lens—is so obviously Galenic that the point needs no elaboration. True, Ibn al-Haytham's description departs from Galen's in certain key respects, Ibn al-Haytham ignoring the retina and proposing a somewhat different geometrical model. Still, there is no denying its Galenic basis at the general level, the specific differences arising from a variety of sources, including possible Arabic intermediaries and the theoretical imperatives that drove Ibn al-Haytham to revise the geometrical model as he did.²³⁶

The clearest, most definite, and most pervasive influence upon Ibn al-Haytham's account comes from Ptolemy's *Optics*. Indeed, I would go—and in fact have already gone—so far as to claim not only that Ptolemy's *Optics* was the cardinal source for the *De aspectibus*, but that, as such, the *Optics* served as a sort of blueprint or model for it.²³⁷ In other words, Ibn al-Haytham constructed the *De aspectibus* upon Ptolemaic foundations. In saying this I do not mean to imply that he simply

modified or elaborated upon those foundations. I mean, rather, that Ptolemy's account was instrumental, as both inspiration and foil, to Ibn al-Haytham. To a great extent, therefore, the *De aspectibus* can be regarded as a carefully considered and critical response to Ptolemy's *Optics*, much of it negative but much of it also positive.

A good case in point is Ibn al-Haytham's account of physical radiation and sense-impression. Having rejected Ptolemy's theory of visual flux for good reason, Ibn al-Haytham was compelled to formulate an effective alternative. The result was his theory of punctiform radiation, which entails the sensitive selection of point-forms arriving orthogonally at the lens. There is no denying the ingenuity and originality of this response. Nor is there denying its absolute centrality to the account of perception and apperception that follows. Nevertheless, in formulating his counter-theory, all Ibn al-Haytham did in the end was to translate Ptolemy's cone of visual radiation into a mathematically equivalent cone of visible radiation. Everything else remains the same, right down to the vertex of the cone, which still serves as the reference-point for spatial perception.²³⁸ So Ibn al-Haytham simply turned Ptolemy on his head. Perhaps it would be an exaggeration, then, to say that without Ptolemy's *Optics* Ibn al-Haytham's *Kitāb al-Manāẓir* would have been inconceivable, but it would not, I think, be much of an exaggeration.

6. *Alhacen and the Latin West: Lines of Influence*

General Intellectual Background: With the increasing contacts between Muslims and Christians during the Reconquista in Spain and the Norman takeover of Arab Sicily during the first half of the twelfth century came a flood of Latin translations based upon Arabic texts (both original sources and translations) that had been inaccessible to northern European scholars up to that time.²³⁹ By the middle decades of the thirteenth century, when the Latin version of Ibn al-Haytham's *Kitāb al-Manāẓir* began to attract serious notice in Europe, most of the core Greek sources known to Ibn al-Haytham were available in Latin. Aristotle's *De sensu et sensato* had been translated by at least the late twelfth century, and so had Euclid's *Optics* and *Catoptrics*. The same holds for Ptolemy's *Optics*, which was rendered from Arabic into Latin sometime in the second half of the twelfth century. Although Galen's *De usu partium* appeared in Latin only toward the end of the thirteenth century, several of his shorter treatises were translated during the course of the twelfth century. Aristotle's *De anima* first appeared in Latin around the middle of the twelfth century, this version being based upon a Greek text. A second

translation, drawn from the Arabic, was produced by Michael Scot sometime in the early thirteenth century, perhaps as early as 1220.²⁴⁰

Many of the Arabic and Greek sources available to, if not actually used by, Ibn al-Haytham also existed in Latin translation. A sampling includes al-Kindī's *De intellectu*, *De aspectibus*, and, perhaps most significant, *De radiis stellarum*. We can also include the *Ten Treatises* and the *De intellectu et intellecto* of Hunayn ibn Ishāq ("Johannitius" in Latin), the *Liber ad Almansorem* of al-Rāzī ("Razes" in Latin), the *De ortu scientiarum* of al-Fārābī, the *Shifā'* and *Canon* of Avicenna, as well as the *De speculis* of Tideus and Pseudo-Euclid. A number of relevant works by Arab scholars who wrote after Ibn al-Haytham, foremost among them al-Ghazālī and Averroes, should be added to this list.²⁴¹

Meanwhile, as these newly translated works filtered into the Latin West, European scholars sought increasingly to incorporate what they learned from them into their own thinking about natural philosophy, metaphysics, and theology. Their own thinking, of course, was rooted in various indigenous traditions of thought that evolved over the eleventh and twelfth centuries. As far as the subsequent development of optics is concerned, the Platonic (or Neoplatonic) tradition looms especially large. Perhaps best represented by Robert Grosseteste (c. 1168-1253), this particular tradition was manifested in the evolution of what is commonly called light metaphysics. Thus, as Grosseteste himself understood it, physical light and its physical manifestations (e.g., rectilinear propagation) are reflective of divine light and its spiritual manifestations.²⁴²

All of this is to say that, as Ibn al-Haytham's treatise entered Europe in its Latin form, the intellectual context within which it came to be read was far different—and in some ways far richer and more variegated—than the intellectual context within which it was written. As an earnest of this fact, we need look no farther than Roger Bacon's *De multiplicatione specierum* and the remarkable variety of authors and works that are explicitly cited or easily identifiable there.²⁴³ Textual and cultural differences aside, however, Scholastic and early Arabic thinkers were much alike in their eclecticism. Wherever logically and doctrinally possible, textual reconciliation or synthesis was the goal. It follows, then, that the way in which Alhacen's *De aspectibus* was interpreted and understood by medieval and Renaissance European thinkers was shaped by, and to some extent also shaped, the intellectual context within which it was read.

This reciprocal relationship between text and context will become clear as we examine the fate both of the *De aspectibus* and of Alhacen's model of vision as they were assimilated by Latin thinkers from around

1260 on. We will start by looking at how that model was accepted within the "scientific" community, our focus being upon the development of mathematical optics, or *perspectiva*, as it came to be known. We will then turn to the philosophical and theological context of the later Middle Ages in order to examine how such seminal thinkers as Peter of Limoges, John Wyclif, and William of Ockham drew upon or reacted to Alhacen's optical analysis as they grappled with certain basic epistemological and theological issues. We will then conclude by discussing the ways in which Alhacen's ideas about light, perception, and aesthetics may have affected certain developments in Renaissance art.

Alhacen and Perspectivist Optics: The extent and depth to which Alhacen's *De aspectibus* affected the development of optics in the Latin West between roughly 1260 and 1650 is so well known by now that it needs no establishing.²⁴⁴ The force of Alhacen's impact upon early Scholastic thought is clear from the relatively sudden emergence of the so-called Perspectivist tradition during the second half of the thirteenth century. At the core of this tradition are four works that drew heavily from, or were based entirely upon, the *De aspectibus*: Roger Bacon's *Perspectiva* (which formed part of his *Opus majus*) and *De multiplicatione specierum*, both probably written in the 1260s; Witelo's *Perspectiva*, which was composed around 1275; and John Pecham's *Perspectiva communis*, which was completed around 1280. A brief look at the dissemination of these works in manuscript form indicates the critical role they played in diffusing Alhacen's ideas about light and sight into the wider intellectual arena of medieval and Renaissance Europe.

Of Bacon's *Perspectiva*, whether in isolation or as part of the *Opus majus*, 39 manuscripts are currently known to exist, 34 of them in more-or-less complete form. Three date from the thirteenth century, 18 from the fourteenth, 11 from the fifteenth, and seven from the sixteenth.²⁴⁵ Bacon's *De multiplicatione specierum*, on the other hand, survives in some 24 manuscript-versions, 18 of them complete or virtually complete. Three date from the thirteenth century, seven from the fourteenth, nine from the fifteenth, one from the sixteenth, and four from the seventeenth.²⁴⁶ By far the longest and most technically demanding of the four derivative works, Witelo's *Perspectiva* is currently known to exist in 29 manuscript-exemplars, 22 of them complete. Among the 24 versions I have been able to place chronologically, one dates from the thirteenth century, 12 from the fourteenth, seven from the fifteenth, and four from the sixteenth.²⁴⁷ John Pecham's brief *Perspectiva communis*, finally, is represented in at least 64 (perhaps 66) manuscripts, all but one of which have been placed chronologically. Two of the resulting 63 date to the thir-

teenth century, 30 to the fourteenth, 29 to the fifteenth, and two to the sixteenth.²⁴⁸ Add to these the 22 known exemplars of the *De aspectibus* itself, and the total number of manuscripts devoted explicitly to Perspectivist optics rises to just under 180.

The number and chronological distribution of these manuscripts serve as one gauge of the continuing interest that Perspectivist optics held for European scholars between the very late thirteenth century and the beginning of the Early Modern period. The early publication-record of the four core treatises serves as another. The Latin text of Pecham's *Perspectiva communis*, for instance, appeared in print eleven times between 1482 and 1665. It was also published in Italian translation in 1593.²⁴⁹ The evident popularity of this treatise is understandable, given that it was intended as an introductory epitome rather than as a comprehensive study. The same cannot be said of Witelo's *Perspectiva*, which is half again as long and at least as technically daunting as the *De aspectibus* upon which it was closely modeled. Yet even so, it saw print three times in the sixteenth century, first in 1535, then in 1551, and finally in 1572, when it appeared in tandem with Alhacen's *De aspectibus* in Risner's *Opticae thesaurus*.²⁵⁰ Roger Bacon's *Perspectiva* and *De multiplicatione specierum* did not fare as well as the others, the former remaining unpublished until 1614, the latter not committed to print until 1733, when it was published by Samuel Jebb along with the *Opus majus*.²⁵¹

The extent to which Perspectivist optics influenced ideas about light and vision during the later Middle Ages and Renaissance is indicated in a variety of other ways. For example, Alhacen's *De aspectibus*, Witelo's *Perspectiva*, and John Pecham's *Perspectiva communis* all served as university texts, primarily for the instruction of mathematics within the Arts curriculum.²⁵² Both students and masters were therefore exposed not only to the analytic techniques, but also to the theoretical underpinnings of Perspectivist optics. The resulting pedagogical tradition is surely reflected, to some extent at least, in the dozens of brief commentaries and synoptic studies—most of them anonymous—that still survive in manuscript form.²⁵³

Perspectivist works were also read extracurricularly, as witness their use by such non-Scholastic thinkers as Leonardo da Vinci (1452-1519) and Lorenzo Ghiberti (1381-1455).²⁵⁴ Likewise, educated but nonacademic thinkers, such as Francesco Maurolyco (1494-1575) and Giambattista della Porta (1535-1615), were well versed in, although somewhat critical of, Perspectivist theory.²⁵⁵ Indeed, so firmly rooted did Perspectivist ideas about light and vision become within the intellectual community of late medieval and Renaissance Europe that, even as those ideas came under attack during the early seventeenth century,

Perspectivist optics provided the very means of its own undoing.

Kepler's account of the eye in the *Ad Vitellionem paralipomena* ("Emendations to Witelo") of 1604 serves as not only a good example, but one that has become canonical since the publication of Lindberg's *Theories of Vision*.²⁵⁶ The purport of Kepler's account was to show that, instead of being a sensitive selector of orthogonal impressions, the lens is nothing but a refractive instrument, devoid of all perceptual functions. On that basis, Kepler re-formed the eye as a camera, the lens merely serving to focus incoming rays at specific spots on the retinal screen at the back, the result being an inverted point-by-point representation of the visual field. However, as Lindberg rightly observes, the analytic tools Kepler used to undermine Alhacen's model of image-selection were provided by Alhacen himself. Thus, to let Lindberg speak for himself, "Kepler presented a new solution (but not a new kind of solution) to a medieval problem, defined some six hundred years earlier by Alhazen." For, "by taking the medieval tradition seriously, by accepting its most basic assumptions but insisting upon more rigor and consistency than the medieval Perspectivists themselves, . . . [Kepler] was able to perfect it."²⁵⁷ Kepler, in short, was the last and best of the Perspectivists.²⁵⁸

Descartes's attempt to justify the sine-law of refraction in the *Dioptrique* of 1637 serves as another example. Descartes's disdain for the "Schoolmen" and all they stood for intellectually is a matter of record, as is his self-imposed mission of reconstructing natural philosophy on entirely new, non-Scholastic foundations. As far as optics is concerned, that meant recasting medieval light-theory in mechanistic terms. The resulting model reduced light to centrifugal impulses transmitted radially in all directions through a perfectly inelastic ethereal medium. One warrant of the validity of this new model, according to Descartes, is that when it is applied to the problem of refraction, it yields the sine-law. As has long been recognized, however, Descartes' attempted demonstration of this principle is anything but convincing. True, it does yield the right result—i.e., the sine-law—but its suppositional foundations are so flawed as to render it logically incoherent.²⁵⁹ What led (or misled) a thinker of Descartes's caliber to offer a "proof" of such dubious merit? The simplest, most plausible explanation is that, in formulating his analysis of refraction, Descartes followed out the logical implications of Alhacen's account of light and its dynamic interactions with physical bodies. Hence, in attempting to undercut the theoretical foundations of Perspectivist optics, Descartes relied so heavily upon them that he undercut himself.²⁶⁰

That Alhacen's account of light and vision did not pass unalloyed into and through Scholastic circles during the later Middle Ages should

come as no surprise, given both the critical and eclectic propensities of Scholastic thinkers. The most significant modifications to that account occurred through elaboration of its theoretical foundations. The central figure in this elaborative process was Roger Bacon. Like Grosseteste, whom he took as both mentor and model, Bacon was convinced that optics provides a window into the creative and providential workings of God. For Bacon, therefore, a complete understanding of physical vision and its ultimate cause in physical light was a necessary step toward understanding spiritual vision and its ultimate cause in divine illumination.²⁶¹ To achieve such an understanding required a more comprehensive approach to light and sight than Alhacen had taken in his account, which is relatively innocent of physical and metaphysical content or implications. Bacon thus took it upon himself to round out Alhacen's account by supplying that content and, in the process, making the implications explicit.

The starting-point for Bacon's elaboration is the physics of light. According to Bacon, all physical entities in the universe are bound together through a network of influences or forces (*virtutes*).²⁶² Each entity radiates its influence outward to surrounding entities in the form of "species." Every entity that is receptive of such influence is affected and, in a sense, transformed by it. The exercise of power is therefore reciprocal. To be acted upon by something is as much an expression of power as to act upon something, the recipient exerting "passive power" (*potentia passiva* or *potentia receptiva*), the agent "active power" (*potentia activa*).²⁶³

Luminosity (*lux*) is an active power. As an inherent property of certain bodies, it has the capacity to express itself through its species, *lumen*. Transparent bodies, for their part, have the capacity to accept and transmit such species. The process of transmission involves multiplication (*multiplicatio*), wherein each spot of *lux* on a luminous surface replicates itself as *lumen* in each part of the transparent medium adjacent to it. What results is a spot-thick shell of *lumen* in the medium surrounding the original spot of *lux*. So actualized, each spot of *lumen* within that shell replicates itself in the adjacent parts of the medium, thus creating a second shell of *lumen*, and so on *seriatim*. The result is a sphere of propagation that can be broken down into individual lines along which the species of *lux* is multiplied spot-by-spot through the medium in a continual passage from potency to act. Throughout this passage, the species serves as both formal and efficient cause, while the medium provides the material cause to support that passage.²⁶⁴

Under its obvious Aristotelian cloak, Bacon's account of light-radiation is essentially the same as Alhacen's, and so is his account of visual perception. Like Alhacen, Bacon conceives of every visible surface as a

mosaic of illuminated color, each spot multiplying its species everywhere transparency permits. Out of all the species that reach it, the lens accepts only those that strike it orthogonally. In that way it selects a point-by-point visible representation of the generating object. Channeled in proper order through the optic complex—and supported in its passage by the visual spirit that pervades the eye and nerve—this representation eventually reaches the optic chiasma. There it is presented to the final sensor, which makes perceptual sense of it as well as of the object it represents.²⁶⁵

Perception occurs at three levels. The lowest is that of brute sensation (*solo sensu*), which is limited to light and color. True perception occurs either by means of previous knowledge (*per scientiam*) or by means of deduction (*per sillogismum*). This latter sort of perception enables us to distinguish and determine the twenty-two characteristics that define the object visibly—i.e., Alhacen's visible intentions. Perception by means of previous knowledge, on the other hand, involves universal and individual forms, so it is through this sort of perception that we recognize not only general types (e.g., "horse" or "human"), but also specific individuals (e.g., Martin or Peter).²⁶⁶

Citing Avicenna as his primary authority,²⁶⁷ Bacon goes on to locate these perceptual and apperceptual functions according to specific faculties or internal senses (*virtutes interiores*) that are distributed among the three cells (*cellulae*) of the brain.²⁶⁸ So located, these faculties constitute what Bacon calls the sensitive soul (*anima sensitiva*). The anterior cell houses the common sense (*sensus communis*) and imagination (*ymaginatio*), which are ranged in that order from front to back. The common sense receives the visible representation passed to it by the final sensor and completes the perceptual judgment of that representative species. The resulting perceptible species is then passed to the imagination for short-term retention. The common sense and imagination together constitute the faculty of fantasy (*fantasia*), "which differs from [its two constituents] as the whole differs from the part."²⁶⁹ Fantasy makes the final and most general perceptual judgment of the object represented by the perceptible species.

The brain's middle cell houses two apperceptual faculties, the estimative (*estimativa*) and the cogitative (*cogitativa*), both of which receive the perceptible species from the first cell and make apperceptual judgments about it. It is through the estimative faculty, for instance, that a sheep judges the malignant intentions of a wolf, even though those intentions are neither sensible nor perceptible.²⁷⁰ The cogitative faculty does much the same thing at an intellectual level, judging the intelligible intentions of sensible objects (e.g., that the internal angles of any

triangle, as represented by all perceptible triangles, sum up to two right angles). The resulting species is remanded to the third cell of the brain, which houses the memorative faculty (*memorativa*). There the final species is stored for recall. According to this model, then, sensation, perception, and apperception unfold in stages, starting at the physical level and passing upward to the intellectual level, each species in turn representing something more general and abstract than its predecessors along the line of multiplication.

Aside from adding Aristotelian flesh to the relatively bare bones of Alhacen's account, Bacon imported certain terminological changes into it. Foremost among these is his replacement of *forma* with *species*. As used by Alhacen, *forma* is best understood in a general sense as "similitude" or "likeness." Accordingly, the form by means of which we see any given object is somehow like that object. However, as we have noted earlier, the form constitutes likeness in several ways. First, it is a likeness according to the light and color radiated from that object to the eye (e.g., a reddish-white blob). Second, it is a likeness according to all of the visible characteristics that define the object physically (e.g., a fairly tall reddish-white featherless biped standing thirty feet away). Third, it is a likeness according to the object's individual identity (i.e., my old friend Martin). Fourth, it is a likeness according to that individual's general type (i.e., human being).²⁷¹

But how are all these subforms contained in the single comprehensive form (*forma tota*) upon which visual perception is based? Do they somehow exist at different levels? Does the universal form, for instance, lie deeper in the comprehensive form than the individual form? What sorts of likenesses are these forms? Does the universal form of "human" actually look human? These questions are never directly addressed by Alhacen, but all indications are that he understood the form to be a depiction of sorts.²⁷² Much like a portrait, then, Alhacen's comprehensive form conveys all sorts of information that is not actually in the form itself. It is there only implicitly.

Bacon's species is similar to Alhacen's form in that it constitutes a likeness of sorts,²⁷³ but it is a likeness with two crucial differences. For one thing, Bacon's species is far more comprehensive than Alhacen's form because it is not so firmly tied to the mere visible expression of things. On the contrary, Bacon's species expresses the object's nature to the fullest extent, from its visible accidents to its very essence. Thus, as Bacon sums it up in *De multiplicatione specierum*, I, 2:

... it is evident that when it is inquired universally concerning every species in the medium, whether it is substance or accident, the answer

is obvious, and likewise whether a species is simple or a certain composite, and whether it is universal or singular. For the species of substance is substance, the species of accident is accident, the species of a composite is composite, and the species of a simple is simple, just as the species of matter is matter, of a form is form, of a universal is universal, and of a singular is singular; for it is to be said, in brief, that as accident is to substance and form to matter and universal to singular, namely, that none of these is without its companion, so is the species of accident to the species of substance and the species of matter to the species of form and the species of a universal to the species of a singular, because none of these is without its companion.²⁷⁴

The key to understanding this passage lies in Bacon's notion of what, for lack of a better word, I will call incorporation. By this I mean both the embodiment and the unification of defining attributes. Accordingly, every physical object is what it is (i.e., a substance) by virtue of incorporating all its defining attributes, from accidents (e.g., color and shape) to essence (e.g., being a rational, mortal animal). Altogether, these attributes constitute the object's nature. All objects express their nature through their species, but when those species exist outside their generating object, they must be incorporated as well.²⁷⁵ What the species actually expresses depends upon what it is incorporated in. When multiplied through transparent media, for instance, species express only the colored luminosity of the object's surface. When incorporated in the crystalline lens, they express the visibility of that surface. When incorporated in the spirit pervading the anterior cell of the brain, they express the object's perceptibility, and so forth, until the essence itself of the object (i.e., its universal nature) is expressed. Thus, every species incorporates the full range of its object's attributes and has the power at any time to express that range. But this power can only be realized if the species is incorporated in something that can actually bring it out.²⁷⁶ That is why the eye, given its peculiar sensitive capacity, cannot perceive essences, whereas the intellect, given its peculiar rational capacity, can. That is also why, in being provided with the capacity to discern them, a sheep can perceive the malignant intentions of a wolf, even though those intentions transcend the wolf's mere physical appearance.

The second crucial difference has to do with Bacon's notion of intentionality, a notion that can be traced back at least to Avicenna.²⁷⁷ Every species, according to Bacon, exists intentionally. By the same token, everything that a given species can possibly express exists in it intentionally. Intentionality, however, is only potential until it is realized. Thus, until it is able to express itself in one way or another, every species exists

at the level of almost pure possibility. I say “almost pure,” because no species can exist without being incorporated, even if only in a transparent medium. As a likeness, therefore, the intentional species in its barest state is almost wholly unlike its generating object because it expresses almost nothing about it. Only when its intentionality is realized does it become like its object, and then only insofar as it is realized. Thus, for instance, when the visible intentions of the species are properly incorporated (and therefore realized), the resulting visual species will be like the object according to its superficial physical attributes. Yet it will be nothing like the object according to its deeper, nonphysical attributes (e.g., the ability to reason or the capacity for moral judgment).²⁷⁸

By construing species in this way, Bacon not only tied visual perception more tightly to intellectual conception than had Alhacen; he also exposed its philosophical implications more clearly. As a result, later Perspectivists, such as Witelo and Pecham, adopted the language of species and species-multiplication not only to describe the radiation of light, but also to describe the visible manifestations of objects. The various stages of perception were increasingly understood in terms of intentional species and their abstraction by the appropriate organ or faculty. From the impinging rays, the crystalline lens abstracts the “visual species” (*species visibilis*). From this the common sense and imagination abstract the “perceptual species” (*species sensibilis*). And out of this, finally, the reasoning faculty abstracts the “intellectual species” (*species intelligibilis*). Each species, in turn, constitutes the proper object of the faculty or internal sense that operates upon it in an effort to realize its next level of intentionality. The entire process from seeing to knowing therefore follows a train of abstractions, at each stage of which the given species is more general and informative. Moreover, since each species in the train of abstractions constitutes a likeness, at one level or other, of the object that generates it, we can be sure that there is an essential correspondence between objective reality and our subjective “picture” of it.²⁷⁹

Thus brought into the framework of Aristotelian physics and psychology, Perspectivist theory provided nothing less than a scientific paradigm of sense-induction. As such, it had enormous appeal among Scholastic thinkers, particularly those of a philosophical bent, who were concerned with epistemological issues. But it also appealed at the level of what today we call physical optics. Particularly noteworthy in this regard is the Perspectivist analysis of reflection and refraction, which is based upon books 4-7 of the *De aspectibus*. In terms of elegance and mathematical sophistication, that analysis is so overwhelmingly superior that its closest rival at the time, Ptolemy’s account of mirrors and

refracting media in books 3-5 of the *Optics*, pales by comparison.²⁸⁰ Small wonder, then, that Perspectivist optics emerged triumphant during the later Middle Ages and Renaissance. Yet we should not be misled into supposing that this triumph was complete. That in fact it was not, and why it was not, merit some discussion.

As we saw earlier, several Greek and Greco-Arabic optical treatises entered Europe in Latin translation during the twelfth century. Thus, long before Alhacen's *De aspectibus* came to the fore in the mid-thirteenth century, European scholars had a significant stock of texts from which to draw in learning the basic principles of ray-analysis. Grosseteste, for example, was familiar not only with Euclid's *Optics* and *Catoptrics*, but also with al-Kindī's *De aspectibus*, and his enthusiasm for ray-analysis was certainly inspired by these works.²⁸¹ Yet, despite his ringing endorsement of ray-analysis, Grosseteste did little or nothing to fulfill its promise at the technical level. That task was left to Roger Bacon.²⁸²

While these early optical texts provide a fairly solid grounding in the geometry of sight, they suffer from one serious defect by comparison with the *De aspectibus*: they are all based on the extramission of visual rays. One would therefore expect that, as Scholastic thinkers became increasingly conversant with Alhacen's intromissionist scheme and realized its explanatory force, they would have rejected the visual-ray theory out of hand. In fact, they did not. The extramissionist analysis of sight was never fully abandoned during the Middle Ages and Renaissance. Even Roger Bacon, persuaded as he was by Alhacen's overall account of light and vision, insisted that the eye must radiate its species out to objects in order to complete the visual act. Throughout the *Perspectiva*, moreover, he appeals indifferently to the authority not only of Alhacen, but also of such extramissionists as Euclid, Tideus, al-Kindī, and Ptolemy. Indeed, at one point, Bacon goes so far as to characterize Alhacen's *De aspectibus* as a mere commentary on Ptolemy's *Optics*.²⁸³ Bacon therefore failed to see any fundamental conflict between the two sources or the theoretical principles upon which they were grounded. To him they were complementary rather than contradictory.

That Bacon was not alone in this view is evident not only from the survival, but also the continued dissemination of Euclid's *Optics* and *Catoptrics*, Ptolemy's *Optics*, Tideus' and Pseudo-Euclid's *De speculis*, and al-Kindī's *De aspectibus* throughout the Middle Ages and Renaissance.²⁸⁴ Admittedly, only one of these treatises, Euclid's *Catoptrics*, was published before the modern era, but publication of Ptolemy's *Optics* was contemplated at least twice during the later Renaissance.²⁸⁵ Why did these works continue to be copied and presumably studied at the same time Alhacen's theory became ever more entrenched within Scholastic circles? The most

obvious explanation is that they were used as introductory texts for the study of “pure” mathematical (i.e., geometrical) optics. In that context, the direction of radiation makes no real difference. Whether the analysis is based upon the Euclidean-Ptolemaic visual cone or upon Alhacen’s cone of radiation is immaterial; the result will be the same, because both cones are mathematically equivalent.²⁸⁶ Still, it is reasonable to suppose that anyone learning mathematical optics on a Euclidean-Ptolemaic basis would have adopted both the analytic perspective and the language of visual radiation. Accordingly, the discourse of visual radiation would be more than a mere *façon de parler*. It would also represent a way of thinking about optical problems. Just as we speak today of the sun’s setting in the west, Renaissance thinkers could speak meaningfully of rays passing out from the eye without taking it literally.

The sixteenth-century Sicilian monk Francesco Maurolyco serves to illustrate this point. That he had a thorough understanding of Perspectivist optics is evident from his general analysis of light in the *Photismi de lumine et umbra* (“Light on light and shadow”), which was published posthumously in 1611 but written much earlier.²⁸⁷ Toward the end of that work, he undertakes an analysis of the eye in order to explain the correction by lenses of two types of visual impairment. The first type—presbyopia or farsightedness—is corrected by double convex lenses, whereas the second type—myopia or nearsightedness—is corrected by double concave lenses.²⁸⁸

At the outset, Maurolyco takes issue with Bacon and Pecham over the claim that the crystalline lens selects only the orthogonal rays and then channels them in proper order to the hollow optic nerve. On the contrary, he insists, since all but one of the rays (i.e., the axial ray) that emerge from the back of the lens are oblique, then all but one of the rays accepted by the lens at its anterior surface must be equivalently oblique. When the lens is properly shaped, the symmetry between incoming and continuing radiation will be such as to bring the rays emerging from the back of the lens to proper convergence (*coincidentia*) at the nerve.²⁸⁹ When the lens is misshapen, though, the rays will not converge properly. If the lens is too flat, the convergence will occur too late, the result being presbyopia. If, on the other hand, the lens is too sharply curved, the convergence will occur too soon, the result being myopia. Since a double concave lens tends to disperse the rays that pass through it, then placing such a lens in front of a myopic eye will keep the rays from converging prematurely by forcing the incoming ones to strike the lens less obliquely than they otherwise would. A double convex lens, on the other hand, will correct presbyopia by gathering the rays and making them come to convergence sooner than they otherwise would.

As described to this point, Maurolyco's account appears to be essentially Perspectivist in tenor, even though he parts ways with the Perspectivists over the cone of visible radiation. But a look at the actual language in which Maurolyco couches that account reveals an even more fundamental parting of the ways. For example, as he explains it in his own words, what actually causes myopia is that, "in hastening to convergence, the visual rays fail to reach the more distant objects that are to be discerned." This happens, he continues, because the rays are too tightly bundled, whereas, under normal circumstances, "being more spread out because of delayed convergence, [they] are extended out to see farther." Hence, in the case of presbyopia, the rays converge so late that only distant objects can be properly seen. So it is "because concave lenses spread out compressed rays, whereas convex lenses compress ones that are spread out [that] short sight is lengthened by concave lenses, and long sight is shortened by convex lenses."²⁹⁰ The implications are clear. The radial convergence that Maurolyco describes in these passages occurs not inward toward the optic nerve but outward toward the visible object. Maurolyco, in short, was basing his explanation upon visual rather than visible radiation.

What prompted Maurolyco to break the rules of Perspectivist analysis with such apparently reckless abandon? I suggest, first, that, by his own lights, Maurolyco was not so much breaking the rules as bending them. In falling back upon the discourse of visual radiation he was offering not a contradictory way, but a complementary way of accounting for the phenomena. I suggest, second, that he took this tack because the phenomena themselves could not be adequately explained along strict Perspectivist lines. The problem is that, according to the Perspectivist account, there are only two ways in which vision can be impaired. One way is by introducing an opaque body, such as cataracts, into the line-of-sight so as to occlude it. The other is by disrupting the proper flow of visual spirit so as to diminish the visual sensitivity of the crystalline lens. In this latter case, sight can be improved by magnifying the image selected at the anterior surface of the crystalline lens. That way the viewer gets what amounts to a closer look at what he is seeing. This, of course, can be achieved by placing a double convex lens in front of the eye. But what about myopia? Its correction depends upon a double concave lens, which not only does not magnify, but in fact *reduces* the resulting image. Perhaps this problem could be resolved along strict Perspectivist lines, but even if it could, the resulting explanation would be inordinately complex. It was because he was casting about for a simpler way of resolving the problem that Maurolyco lapsed into the discourse of visual radiation.²⁹¹

A brief look at Galileo's attempt to explain the working of his new telescope at the beginning of the *Siderius Nuncius* of 1610 may shed some light upon this point. As Galileo describes it, his telescope consists of two lenses encased at either end of a tube, one plano-convex (the objective lens), the other plano-concave (the eyepiece). The optics of this system of lenses is fairly complex, involving the focusing properties of both kinds of lenses. Galileo's explanation, however, is simplicity itself:

For the sake of easy comprehension, let ABCD be the tube and E the eye of the observer. When there are no lenses in the tube, the rays proceed [from the eye] to the object FG along the straight lines ECF and EDG, but with the lenses inserted they proceed along the refracted lines ECH and EDI. They are indeed squeezed together, and where before, free, they were directed to the object FG, now they only grasp the part HI.²⁹²

Galileo, of course, knew better than to believe that vision is actually due to the emission of visual rays from the eye. A mere glance at his discussion of light and reflection in the rest of the *Siderius Nuncius*, as well as in the "First Day" of the *Dialogue* of 1632, shows that he fully understood and accepted the principles of light-radiation and their application to sight.²⁹³ Why, then, did he cast his explanation of the telescope in the language of visual rays? Again, I suggest that, faced with an extraordinarily complex phenomenon, Galileo, like Maurolyco, chose the simplest, most convenient mode of analysis in order to make sense of that phenomenon. The resulting explanation may not have been technically "correct," but, as far as Galileo was concerned, it was adequate for his readers. Otherwise, he would never have dared publish it for fear of damaging his precious reputation.²⁹⁴

The evident willingness not only of Maurolyco and Galileo, but of their intended audience, to view the theories of visual radiation and visible radiation as complementary rather than contradictory may strike us as puzzling today. But it will strike us as far less puzzling if we bear the following four points in mind. First, the two theories are not actually contradictory, Alhacen's refutation of the visual-ray theory notwithstanding. All he actually demonstrated in that refutation was the logical inferiority, not the impossibility of the visual-ray theory.²⁹⁵ Second, as we noted earlier, Scholastic thinkers inclined toward eclecticism and, on that account, tended to be conciliatory in their approach to ideas. Third, there was at least some tendency to compartmentalize theoretical knowledge during the Middle Ages and Renaissance. Medieval and Renaissance medical thinkers, for instance, overwhelmingly favored Hunayn's model of the eye—with the crystalline lens located dead-cen-

ter in the ocular globe—even though that model is wholly incompatible with the Perspectivist analysis of image-selection and image-transmission through the eye.²⁹⁶ Finally, as the later Middle Ages and Renaissance wore on, thinkers became increasingly instrumentalist in their approach to theory. Theories were therefore judged to be more or less probable according to their ability to “save the appearances.” But probability was no gauge of truth, only of effectiveness.²⁹⁷ It is for all or most of these reasons, I think, that, although it achieved authoritative status, Alhacen’s theory of light and sight never fully swept the field during the Middle Ages and Renaissance.

Alhacen and Scholastic Philosophy and Theology: According to Lindberg, the study of optics by Scholastic thinkers during the later Middle Ages can be classified according to three basic traditions, each defined by curricular context.²⁹⁸ The first of these, the so-called Perspectivist tradition, focused upon technical issues. Theodoric of Freiberg (d. 1311), who wrote a path-breaking study of the rainbow (*De iride et radialibus impressionibus*) falls within this tradition. So do Domenico de Clavasio (d. c. 1360), Henry of Langenstein (d. 1397), and Blasius of Parma (d. 1416), all of whom commented specifically upon the science of *perspectiva*.²⁹⁹ The second tradition, which Lindberg defines as “Aristotelian” (and thus centered on the study of natural philosophy) is represented by such thinkers as Jean Buridan (d. c. 1358) and his disciple, Nicole Oresme (d. 1382), both of whom brought Perspectivist theory to bear in their analyses of Aristotle’s *De anima* and *Meteorology*.³⁰⁰ The third and final tradition is defined by Lindberg as “theological,” its primary focus being upon Bible-commentaries (especially on the book of “Genesis”) and *Sentences*-commentaries. Lindberg cites William of Ockham as a prime example.³⁰¹

This threefold classification makes sense at a superficial level, but in actuality the distinction among traditions—particularly the distinction between the Aristotelian (or philosophical) and theological traditions—is more analytic than real. As part of God’s revelation, nature was worth studying only for the insights it could give us into His higher providential purposes. Accordingly, the “book” of nature was generally regarded as ancillary to the book of scripture—hence the oft-repeated characterization of philosophy as the handmaiden of theology. It was certainly with this point in mind that Bacon undertook his analysis of vision in the *Perspectiva*, not because he was concerned with sight *per se* but because he believed that to understand physical vision was instrumental to understanding spiritual vision. The biblical warrant for such an understanding is undeniable. Scripture is rife with visual imagery, none

perhaps more telling than Christ's repeated declaration, "I am the light of the world" (John, 8:12, 9:5, and 12:46). Yet, however bright that light may be, we are still condemned in this world to see "in a mirror dimly" (I Corinthians, 13:12)

As we noted earlier, Alhacen's account of sight offers the possibility of visual certitude. If the ambient conditions are right and the eye scans the object with due care and attention, we get a veridical view of that object. Even in the case of visual illusion or misperception, we can intellectually rectify the deception by understanding precisely how it is produced. Thus, when we see an object behind a plane mirror, we are able to rectify the deception according to our knowledge of the rules of reflection, particularly the law of equal-angles. Why, then, might the same sort of rectification not work for weak or deformed spiritual vision?

In response to this sort of question Peter of Limoges (d. 1306) composed the *De oculo morali* ("On the Moral Eye"), a handbook of spirituality that was enormously popular throughout the Middle Ages.³⁰² Like Bacon (and perhaps under his influence), Peter seems to have believed in a fairly strict analogy between physical and spiritual vision. On that basis, he classified spiritual vision according to three basic types. The first, which corresponds to direct vision, can only be attained in the beatific state after resurrection. It is in this state, which yields an absolutely unhampered and veridical view of things, that the saved will see God "face to face" (I Corinthians, 13:12). The second type of spiritual vision corresponds to refracted sight. This mode of seeing is reserved to the soul when it is detached from the body and awaits the final resurrection. The third type of spiritual vision corresponds to sight through reflection. The only type available to us in this life, this mirror-vision—the kind through which we see dimly—is the weakest and most subject to misperception. Hence, what we see (and therefore misperceive) through the moral eye must be rectified through inner judgment. For instance, a rich man, immersed as he is in a pool of wealth, will appear unduly magnified to a poor man, just as objects submerged in water appear larger than they really are. Only when the moral viewer realizes this does he also realize how distorted his view of worldly goods and their worth really is. Only then, as well, can he attempt to rectify that view through a deeper spiritual awareness of self.³⁰³

John Wyclif (c. 1328-1384) was also convinced that spiritual vision could be understood through its physical counterpart and, like Peter of Limoges, drew upon Perspectivist lore to illuminate theological matters.³⁰⁴ As might be expected, therefore, Wyclif classified spiritual vision according to the threefold scheme of direct (i.e., beatific), refracted (i.e., before the final resurrection), and reflected (i.e., in this world). He

even went so far as to liken the seven deadly sins to the seven types of mirror analyzed by Alhacen—plane, cylindrical convex and concave, conical convex and concave, and spherical convex and concave—each distorting moral vision in a particular way.³⁰⁵

Surely the most interesting application of optical notions to theology, however, involves Wyclif's doctrine of the Eucharist, one of several of his teachings that were condemned at several reprises between 1380 and 1414. At the core of Wyclif's eucharistic theology is the denial of transubstantiation: Christ simply could not be bodily present in the host everywhere the Eucharist was celebrated. Yet Wyclif did not deny Christ's presence altogether; he simply reduced it to virtual or intentional status. Like an image in a mirror, Wyclif explained, Christ's presence is reflected in the host, so He can be imaged everywhere without himself being somehow bodily distributed among the elements of the host. If the spiritual eye of the communicant is healthy and adequately perceptive, then it can "see" that presence in the consecrated host. The ultimate effect of the sacrament would thus seem to be contingent upon the grace-full rectification of the communicant's spiritual sight, not the physical infusion of divinity into the host itself.

Suffice to say, the effectiveness of such analogies depends upon the assumption that, under the proper physical circumstances, direct vision really is veridical. But what if it is not? What if the actual certitude of direct vision can be called into doubt? On the face of it, this would seem to be a purely philosophical question demanding a purely philosophical response. Within the context of its raising, however, its theological import is evident. Equally evident is the theological need to respond to it with a critical evaluation of the Perspectivist account of sight. It should therefore come as no surprise that it was primarily theologians who undertook this critical evaluation during the first half of the fourteenth century.

Among the issues that informed this critique, two are of particular concern here. The first, and simpler, involves the question of precisely what it is we are seeing when we look at a given object. At first blush, the answer is self-evident: we see the object itself. But if, as the Perspectivists would have it, we see every object by means of intentional species passed through the transparent medium to the eye and thence through the optic complex to the brain, then might it not be the case that we are actually seeing not the objects themselves but the species that represent them? In other words, the real object of vision may be the representational form, not what it represents. If so, then in mediating our visual apprehension of things, species actually stand in the way of that apprehension, even in the etiolated state in which Bacon left

them.³⁰⁶ To make matters worse, Perspectivist theory assumes that our final intellectual grasp of things is mediated by a succession of different, albeit related, species, each abstracted from the other. How, then, could we possibly reach through such a thick screen of intervening entities to the things themselves?

The second issue has to do with our intellectual apprehension of things, what is called “abstractive cognition” in later Scholastic parlance. The central problem here is to explain how we grasp the essential natures of things from the sensible forms—Bacon’s “diffuse particulars”³⁰⁷—that represent them in the sensitive soul. On the one hand, our intellectual realization of those natures seems to be inextricably tied to sensible representations, which are material and corruptible. On the other hand, intellect and its objects are immaterial and incorruptible. So how can true cognition, whose object is absolutely general and unchanging, subsist in the incorporated soul, which is both particular and changeable? Is intellect somehow distributive, whole and complete in each and every soul, or is it common to all and therefore transcendent?

Over the century that separated Gundissalinus’ *De anima* (“On the Soul,” c. 1170) from St. Thomas Aquinas’ *De unitate intellectus* (“On the Unity of Intellect,” 1269), a number of Latin thinkers grappled with these questions in an effort to establish a meaningful relationship between pure intellect (spirit) and the sensitive soul (matter).³⁰⁸ Several of these thinkers appealed to an ulterior intellectual power that not only helps us realize the true intellectual intent of the species abstracted by the material soul, but also validates that realization, thus guaranteeing its certitude.³⁰⁹ For a variety of reasons, primarily theological, this position was abandoned toward the end of the thirteenth century.³¹⁰ Intellect, as well as its objects, would thenceforth be treated as distributive rather than common and, therefore, as an integral part of each particular soul. In addition, if the theological demand for personal immortality was to be met in a meaningful way, intellect had to be able to subsist in all its particularity when separated from the body at death. Hence, by the turn of the fourteenth century the incorporated soul had been endowed not only with the potential to know, but also with the capacity to bring that potential to fulfillment. No longer would appeal be made to extrinsic agents either to complete or to validate the act of cognition. The human intellect was on its own.

The issue of certitude thus loomed large for early-fourteenth-century thinkers. After all, if the act of cognition is personal, then perhaps the general conclusions it yields are personal as well. If so, then what is to guarantee the universality or commonality of those conclusions? Furthermore, if the incorporated intellect acts independently of any ulte-

rior agent, then it has access to knowledge only through the sensible particulars about which it reasons. The objects of knowledge would therefore be as particular as the sensible objects from which they arise. In short, all we can really know or know about is individuals—this man or that horse, not Man or Horse. Furthermore, if our access to such individuals is mediated by species, then we cannot even be sure that we can know the individuals themselves.

In response to such issues, several fourteenth-century thinkers—William of Ockham (d. 1349) best-known among them—undertook to construct an appropriate epistemology.³¹¹ One of the first casualties of this effort was the intentional species. For, as we have seen, one could argue that such species actually mask rather than reveal the sensible particulars they supposedly represent. Also, it is difficult to understand how species can “intend” such things as distance that are not intrinsic properties of physical objects, a point that is reinforced by Alhacen’s deductive account of distance-perception.³¹² Why not, then, make our intellectual access to external objects as immediate as possible? The theory of intuitive cognition was, of course, designed to do just that, to strip away the stagings of sense-apprehension mandated by Perspectivist theory in order to make it as direct and primal as possible.

Another casualty of the early-fourteenth-century epistemological critique—one that was already badly damaged—was the universal. If sensible particulars are the only things to which we have intellectual access, and if cognition is truly personal, then perhaps the universal (e.g., Man or Horse) is nothing more than a taxonomical category. If so, then “Man” or “Horse” exists in name only, an expression of the way we mentally group individuals for the sake of convenience. Accordingly, the “universal” may no longer be common or general except by convention. Likewise, the abstractive generalizations we make about those “universals” may be as personal and particular as the terms (and the signification of those terms) in which they are couched.

If nothing else, this simplified (perhaps even simplistic) account makes it evident that the epistemological critique carried out during the first half of the fourteenth century by the likes of Peter Aureol, William of Ockham, and Nicholas of Autrecourt threatened the Perspectivist model of sight to its deepest underpinnings. This it did at a practical level by calling into question the doctrine of intentional species upon which the Perspectivist account of perception depends. More to the point, by demonstrating the utter inconclusiveness of that account, it openly subverted the promise of visual certitude offered by Perspectivist theory. On the other hand, the theory of intuitive cognition carried its own train of difficulties, not the least of which was that it made little or

no sense at the physical level.³¹³ Nor, for that matter, could it offer any better hope of intellectual certitude than its Perspectivist counterpart. The best we could achieve in either case was probability, and probability at this time was determined by social convention: what most men of sound intellect agreed upon was to be assented to until a more persuasive alternative was found.³¹⁴

In this sense, of course, probability is a weak reed upon which to lean, because its warrant is internal and subjective (albeit social) rather than external and objective. That, no doubt, is why the theory of intuitive cognition was essentially a dead end. Few at the time, or afterward, were convinced by, much less truly understood, the theory in all its complexity.³¹⁵ Fewer yet were persuaded by it to jettison the Perspectivist account of visual perception or the doctrine of species-multiplication that underpinned it. Still, it is difficult to believe that Perspectivist theory emerged unscathed from the epistemological critique discussed above and, therefore, that it was accepted as unreservedly after 1350 as it was before 1300—hence the failure of Perspectivist optics to win unqualified assent during the Middle Ages and Renaissance. Hence, too, the persistence of visual-ray theory during that period. Moreover, as we pointed out earlier, late-medieval and Renaissance thinkers inclined toward instrumentalism in their approach to natural philosophy. They reasoned that since there is no way to establish the absolute truth of any scientific hypothesis, the only reason to prefer one over another is its superior ability to “save the appearances.” Logically speaking then, it was not truth or falsity but explanatory power that determined theory-choice. Every such choice was therefore *faute de mieux*, not definitive.³¹⁶

The resulting sea change in philosophical attitude during the later Middle Ages and Renaissance has been the subject of much discussion since the early decades of this century. Some have viewed it negatively, in terms of a corrosive skepticism that destroyed the philosophical and theological synthesis so carefully wrought during the thirteenth century.³¹⁷ Others have viewed it positively, in terms of a critical open-mindedness that pointed the way toward modern philosophy and science.³¹⁸ Value-judgments aside, though, there is general agreement among scholars that traditional philosophical and theological ideas underwent a critical re-examination during the fourteenth and succeeding centuries.

In science, or natural philosophy, it was Aristotle who bore the brunt of this re-examination. Nevertheless, as Marshall Clagett, Anneliese Maier, and a long train of successors have shown, the assault they mounted against Aristotle was piecemeal rather than wholesale.³¹⁹ Specific Aristotelian tenets were carefully scrutinized and rejected if found

logically problematic; but the general framework of Aristotelian analysis was never really in jeopardy. As far as optics is concerned, Maurolyco's willingness to bend the rules of Perspectivist analysis in order to explain lenticular correction exemplifies this piecemeal approach. On the one hand, he felt free to deny that the crystalline lens selects only orthogonal rays, choosing instead the more "probable" supposition that the lens selects a certain set of oblique rays. On the other hand, his critique did not extend to Perspectivist analysis as a whole; indeed, it is clear that he accepted most of the key tenets upon which the Perspectivist model was founded.³²⁰

This brings us back to the issue of certitude. To accept the Perspectivist model of visual perception on a provisional basis was not merely to acknowledge its diminished certitude or probability but also to invite close, critical scrutiny of every aspect of that model. Viewed in this light, Kepler's analysis of vision in the *Ad Vitellionem Paralipomena* of 1604 takes on new meaning and significance.

As we noted earlier, what Kepler achieved in this analysis was to transform the crystalline lens from a sensitive selector of orthogonal rays into a mere refractive body projecting real images upon the retinal screen at the back of the eye.³²¹ We also noted that, by Lindberg's account, Kepler's analysis of the lens and its focusing properties was firmly rooted in Perspectivist principles. All Kepler really did, Lindberg concludes, was to follow out the logical implications of Perspectivist ray-analysis with unprecedented rigor.³²² Accordingly, at the level of physics and geometry, Kepler can be understood as having done little more than move the visual image from the front to the back of the eye.

In emphasizing the continuity between Perspectivist and Keplerian optics at the physical and mathematical level, however, we risk losing sight of a more profound and significant discontinuity between the two. For, by recasting the physical model of vision as he did, Kepler not only moved the visual image to the retina; he also rendered the epistemological foundations of Perspectivist optics moot. For one thing, the image formed on the retina according to Kepler's analysis is inverted. For another, it is real, not virtual, a physical rather than a psychological construct. For yet another, it is far too large to pass into and through the optic nerve to the brain. How, then, does this image represent its object to the faculty of perception? Does the brain send something out to the image in order to scrutinize it? If so, then why do things appear upright rather than inverted? Worse yet, if the retinal image is perceived by some cerebral emissary, then the image itself, not what it represents, must be the proper object of perception. Acceptance of Kepler's model of visual imaging therefore demands a wholesale rejection not only of

the theory of intentional species, but of the entire epistemological structure built upon it.³²³ According to Kepler's model, there is no longer any meaningful correspondence between physical cause (the formation of real images on the retina) and cognitive effect (the formation of concepts and ideas in the brain).

But why was Kepler willing to sacrifice the epistemology of species, so integral to the Perspectivist analysis of sight, for the sake of a more "probable" physical model of vision? I suggest that he was making a trade-off of sorts, rejecting a theory of sense-cognition whose uncertainty was already well established in favor of a physical theory whose probability seemed clearer. In the process, he severed the perceptual link between eye and brain that Alhacen and his Perspectivist followers had constructed with such elaborate care. Kepler therefore did not merely bend the rules of Perspectivist analysis; he shattered them and, in so doing, opened the way toward a complete disintegration of Alhacen's synthesis.

That Kepler seems to have been unfazed by the potential destructiveness of his visual model is remarkable enough. More remarkable yet is that so many of his contemporaries and near-contemporaries followed him in adopting that model despite its epistemological consequences. And herein lies the real significance of Kepler's analysis of the eye and its function: namely, that it found a receptive audience of sufficient size and sufficient willingness to abandon the Perspectivist model in its entirety. Among this group, Descartes assumes especial importance not only because he subverted the Perspectivist theory of light and sight with such alacrity, but also because he attempted to construct an alternative on its ruins.

As might be expected, Descartes singled out two issues for critical scrutiny. The first involves the purported correspondence between physical cause and perceptual effect in our visual apprehension of things. Do we really need to assume such correspondence? Not at all, responds Descartes; it is wholly unnecessary, he asserts confidently in the *Dioptrique* of 1637, "to assume . . . that there is anything in [external] objects that is similar to the ideas or sensations we have of them." What about "those tiny images fluttering through the air, called *intentional species*, which exercise the imagination of Philosophers so much?"³²⁴ Are they necessary? Again, the answer is "no." The doctrine of intentional species merely obfuscates things.

There is, of course, nothing new in Descartes's critique of intentional species and the assumption of correspondence that follows from their acceptance. The same issues were raised in the fourteenth century. But, unlike his fourteenth-century predecessors, Descartes had a clear alter-

native in mind. That alternative was grounded in his mechanistic theory of light. All light-sources, Descartes claims in the *Dioptrique*, are to be thought of as agglomerations of extremely tiny particles of Fire.³²⁵ As a whole, these agglomerations rotate swiftly in place, each constituent particle rotating with the whole and thereby striving to fly out centrifugally, just as the stone in a whirling sling seeks to pull away from the hand that constrains it. What keeps these light-sources from flying apart is the tight press of Air, which forms an enveloping continuum throughout what we take to be space. Accordingly, light consists of centrifugal pressure exerted against the aerial envelope by the particles of fire swirling at the surface of any given light-source. This pressure is passed radially through the Air in the form of continuous impulses that are transmitted instantaneously. Those that reach the eye create a subjective impression that we call "light."³²⁶ Color, for its part, consists in the spin imparted to the spherical Air-particles by such impulses. The faster the spin, the more vivid the color.

The disjunction between objective cause and subjective effect implied by this account is as evident as it is stark. Our internal impressions of "light" or "red" are obviously incongruent with the mechanical impulses or spins that somehow give rise to them. But if objective cause and subjective effect are so radically different, then the planes within which they operate must be radically different as well. That, of course, is the point of the distinction between mind (*res cogitans*) and body (*res extensa*) that Descartes draws so sharply in the *Meditations on First Philosophy* of 1641. The one operates on a purely spiritual plane, the other on a purely material plane. Thus, like so many of his medieval antecedents, Descartes was faced with explaining how extended substance (matter) could interact meaningfully with thinking substance (spirit).

Now, according to Descartes, sensible impressions are utterly deceptive, because they lead us to believe that light and color, as well as a host of other sensible qualities, are real and inherent properties of things, not mere psychological states. If, therefore, we take such sensible impressions at face value, we will invariably be misled. Yet, as subjective entities, we have no other way of apprehending the objective world than through such sensible impressions. How, then, is it possible for us to make intelligible sense of that world? Descartes's answer rests on the notorious "cogito" argument in *Meditations* II. However doubtful I may be about what I think, Descartes asserts in that argument, I cannot possibly doubt that it is I who am entertaining my thoughts. The fact of self-existence is therefore absolutely certain and veridical. Furthermore, once realized, this fact is absolutely clear and distinct to all of us. It follows therefore that whatever is equally clear and distinct must be as

certain and veridical as the fact of self-existence. What is it about external objects that is clear and distinct? Surely not color, nor brightness, nor heat, nor any other sensible quality. All that is left, Descartes concludes in *Meditations* IV, is the fact of extension. Whatever else we may doubt about external objects, we cannot doubt that they occupy extension. That, at bottom, is what is real about them and therefore what makes them truly intelligible. Accordingly, we can make real sense of the external world only in extensional terms, in terms, that is, of geometrical qualities and relations, such as shape and size. These are the true visible intentions of things, not color or light.

For Descartes, then, vision *can* be veridical, but only when it is subject to the rectification of clarity and distinctness, and this rectifying principle is as intuitive as the grasp of self-existence that yields it. In short, we have an innate capacity to perceive directly *through* the sensible appearances to the things themselves, as they actually exist in Euclidean "space." Sense-cognition for Descartes is therefore essentially intuitive and immediate, not abstractive. It depends upon, but it is not abstractively derived from, physical sensation. To establish this point at a physical level, Descartes draws on an analogy between light-radiation and the cane of a blind man. It is by means of this cane that the blind-man feels his way about the world, the impulses passed through it to his hand allowing him to judge the various spatial dispositions (e.g., size, shape, or position) of the bodies it strikes. The pain or shock we may experience from such contact is irrelevant to that judgment, so the blind man's apprehension of "space" is virtually immediate. Seeing is like this. Accordingly, the sensations of light and color that arise when we apprehend things visually have nothing to do with what the light-impulses passed to us from those things tell us about their inherent and real extensional properties. Such sensations are concomitant with, not causally prior to, the perception of those properties.³²⁷

This point is crucial. As we have seen, Alhacen and his Perspectivist followers predicated their account of sight upon the assumption that light and color are real, intrinsic properties of physical objects and therefore that we apprehend those objects solely by means of the light and color in them. Light and color, in short, are truly definitive for visual perception and cognition. The remaining visible properties, or intentions, are perceived incidentally inasmuch as they are abstracted from the primal apprehension of light and color. Hence, according to the Alhacenian account, the extensional or spatial properties of things are secondary to light and color, at least at the perceptual and cognitive level. For Descartes, on the other hand, being no more than subjective states arising from more fundamental mechanistic causes, light and color

are reduced to secondary status, the extensional properties of objects assuming primacy insofar as they occur to us immediately (or virtually so) through the mechanical impulses that expose them.

At the broad conceptual level, Descartes's account of vision was not particularly original. We saw earlier that most of the key issues addressed in that account—i.e., the vexed relationship between sense-perception and cognition, the problematic link between mind and body, the questionable status of intentional species, and the fundamental uncertainty of sense-perception—had been dealt with at length and in depth by his medieval predecessors, particularly those of the early fourteenth century. Likewise, Descartes's attempt to place cognition upon an intuitive basis was hardly novel. Nor, for that matter, was his effort to reduce physical reality to purely geometrical terms. What is new, however, is the precision and clarity with which he analyzed and highlighted the aforementioned issues in an effort to dismantle the entire framework of Perspectivist analysis and then reconstruct the science of optics from the ground up on the basis of his mechanistic model of light and sight. Central to this reconstruction was a radical disjunction between objective and subjective worlds and a consequent dichotomy between primary (i.e., geometrically determined) and secondary (i.e., perceptually determined) qualities. To accept such a dichotomy, of course, was to reject outright the Perspectivist analysis of sight, which was expressly designed to link the two worlds, physical and perceptual, as tightly as possible. Perhaps more than anything else, it was the breaking of that link and the resulting disintegration of Alhacen's synthesis by Kepler, Descartes, and their seventeenth-century successors that opened the way for the development of modern optics according to its current physical, physiological, and psychological divisions.

Alhacen and Renaissance Art: For most art historians since Vasari, the transition from medieval to Renaissance art is marked by the development of naturalism in painting, a development that began roughly with Giotto (d. c. 1337) and culminated with Michelangelo (d. 1564).³²⁸ Among the many facets that characterize this development, particularly in its later phases, is a fascination with various modes of image-distortion. Examples abound, but perhaps the two best-known are Jan van Eyck's depiction of a convex mirror, with its distended image, in the background of *The Marriage of Arnolfini* (1434)³²⁹ and Hans Holbein the Younger's anamorphic representation of a skull in the foreground of *The French Ambassadors* (1533).³³⁰

At a somewhat superficial level, this connection between art and optics makes sense in the light of certain technical developments over

the period in question. The quality of mirrors, for instance, had improved considerably over the sixteenth century with the invention of the true looking glass, backed by an amalgam of tin and mercury. Not only did such looking glasses provide clearer images than even the best silver mirrors, but they had the added advantage of being cheaper. At the same time, metal mirrors were being manufactured from various alloys in an effort to provide the image-quality of polished silver at a lower price. Well before the invention of looking glasses, moreover, concave mirrors, presumably of well-polished steel or silver, were in use as magnifying aids for scribes and illuminators doing close work. One of the earliest examples is represented in a fourteenth-century portrait of Pietro Isnardo of Vicenza, the mirror standing on a shelf directly above his writing desk.³³¹ No less common at the time were corrective lenses, whose manufacture had become so standardized in Florence by the second half of the fifteenth century that eyeglasses were produced there virtually to specification for the improvement of presbyopia and myopia.³³² Indeed, if Francesco Maurolyco is to be credited, such eyeglasses were more-or-less routinely available by no later than the early sixteenth century.³³³

While the proliferation of such devices over the fifteenth and sixteenth centuries must have made artists ever more acutely aware of the ways in which optical effects can skew what we see and how we see it, the awareness itself was hardly new. The effort among early Renaissance artists to import illusionism in their paintings bespeaks it clearly. Giotto attempted to naturalize the visual space he represented not only by framing his scenes as if they were viewed through a window, but by ordering them according to the convergence of parallels and the foreshortening of objects seen at increasing distances. In thus applying "empirical perspective," Giotto took a major step toward what Samuel Edgerton characterizes as "the geometrization of pictorial space."³³⁴ Another means that Renaissance artists used to naturalize the representation of visual space was the technique of *chiaroscuro*, which was brought to relative perfection by Leonardo da Vinci. The point of *chiaroscuro*, of course, is to emphasize the depth of the visual field by representing the play of light and shadow upon various objects within that field and thereby "modeling" them in space.³³⁵

That such illusionistic techniques were employed in Greco-Roman paintings and mosaics was well known to Renaissance artists, who looked to classical models for guidance and inspiration, much like their humanist counterparts in literature.³³⁶ However, what set these Renaissance artists apart from their classical forebears, at least to some extent, was the firm belief that, in order to depict what they saw (or could imag-

ine to see) with appropriate fidelity, they had to understand as precisely as possible *how* the things they painted were visually presented to them.³³⁷ It therefore became incumbent upon Renaissance artists to understand both the objective world they represented (hence, for example, Leonardo's forays into anatomy) and the visual system that ultimately determined how that world was represented to them.³³⁸ To this end, they had a variety of authoritative optical sources available, and among these sources, Alhacen's *De aspectibus* and the various Perspectivist texts and commentaries based upon it figure prominently.

That many Renaissance artists actually did read, or were at least conversant with, these sources is beyond question. Surely the most ostensible case is Lorenzo Ghiberti (d. 1455), whose "Commentario terzo"—the third book of *I commentarii*—on art contains extensive quotations or paraphrases from the fourteenth-century Italian translation of Alhacen's *De aspectibus* mentioned earlier.³³⁹ Somewhat more problematic is Leonardo da Vinci. On the one hand, we have good reason to believe that he at least consulted Witelo's *Perspectiva*, and we know for a fact that he read at least the beginning of John Pecham's *Perspectiva communis*.³⁴⁰ On the other hand, as Bruce Eastwood has shown, Leonardo's discussion of image-inversion in *On the Eye* (c.1508?) reveals a fairly limited understanding of Perspectivist concepts.³⁴¹ Still, there is no question that Leonardo's thinking about image-inversion, as well as other optical matters, was formed to a great extent by the Perspectivist tradition within which he worked. Resist it though at times he might, Leonardo could never really escape the hold of that tradition.³⁴²

To demonstrate that Renaissance artists read, or knew of, the relevant optical sources is not, however, to demonstrate how their understanding of those sources may have influenced their art. The clearest case of such influence is to be found in the invention (or reinvention) of linear perspective in the early fifteenth century. This is traditionally ascribed to Filippo Brunelleschi (d. 1446), who is said by his biographer, Antonio Manetti, to have painted two depictions—one of the baptistery in front of the Florentine cathedral, the other of the Piazza della Signoria in the heart of Florence—according to the rules of "what painters today call perspective."³⁴³ These two scenes, Manetti contends, were so true-to-life that viewers had difficulty in distinguishing the painted version from the real thing. Unfortunately, Brunelleschi himself left no written account of the technique with which he is credited, so any attempt to reconstruct it or to isolate the sources upon which it may have been based is at best speculative.³⁴⁴

The earliest known written description of linear perspective occurs in the first book of Leon Battista Alberti's brief three-book treatise, *Della*

pittura (c. 1436), which, tellingly enough, is dedicated to Brunelleschi.³⁴⁵ The technique that Alberti outlines there is easily understood in geometrical terms, even though he himself provides no diagrams to help us visualize it. We start, according to Alberti, by delineating a quadrangle on the panel to be painted, this quadrangle representing “an open window through which [we] see what [we] want to paint.”³⁴⁶ Having determined how large we want to figure a man within the foreground of this quadrangle, we take a third of that amount as a measure. We then divide the bottom edge of the quadrangle into as many equal segments as we can according to that measure.

With this done, we choose a centric point within the quadrangle. This point, which should lie as high above the lower edge of the quadrangle as the top of the man figured in the foreground, is where the central ray extending from the painter’s or viewer’s eye (i.e., the visual axis) strikes the panel. It therefore marks the level at which “the beholder and the painted things he sees will appear to be on the same plane.”³⁴⁷ We then connect all the points of division on the lower edge of the quadrangle to the centric point, which thus serves as the vanishing point upon which all the parallels represented by the lines just drawn converge. Next, we cut these convergent parallels with horizontal lines in such a way that the distances between the selected horizontals become proportionately smaller as they approach the centric point. Finally, we draw the centric line (i.e., the horizon-line), which is parallel to the top and bottom edges of the quadrangle and passes through the centric point. This last line, Alberti concludes, “is a limit above which no visible quantity is allowed unless it is higher than the eye of the beholder.”³⁴⁸

Where might Alberti have gotten the idea for such a scheme? Here we are on relatively sure ground. For a start, the projection-device Alberti describes, with its centric point, its central ray, and its various planar cuts along the horizontal, is nothing more than the Euclidean-Ptolemaic visual cone or *mutatis mutandis* Alhacen’s cone of vision. Furthermore, Alberti is quite explicit in acknowledging the optical basis of his technique. He spends considerable time at the beginning of book 1 explaining how the visual cone (or cone of vision) is formed at the center of the eye, how its constituent rays pick out the shapes of external objects, how those same rays determine the appearance of size among such objects, and so forth.³⁴⁹ In the process, he makes three things abundantly clear. First, if the artist is to master his skill properly, he must have some understanding of the relevant optical principles. Second, although “among the ancients there was no little dispute whether these rays came from the eye or the plane [of the visual field],” the direction of radiation is

immaterial.³⁵⁰ The geometry of radiation is all that concerns the artist. Third, the fact that Alberti was aware of the dispute between extramissionists and intromissionists suggests that he either knew, or knew of, Perspectivist theory, a suggestion strengthened by his refusal "to discuss whether vision, as it is called, resides at the juncture of the inner nerve or whether images are formed on the surface of the eye as a living mirror."³⁵¹

It has long been argued, and quite plausibly, that the development of linear perspective in art was based upon Perspectivist ray-analysis and its perceptual entailments.³⁵² While this may be the case, though, it is not necessarily so. It could as easily be maintained that Euclidean (or Ptolemaic) ray-theory provided the analytic basis for this development.³⁵³ Or, for that matter, linear perspective may have had its primary source in the surveying techniques known to anyone of a practical bent in Renaissance Florence. Such, of course, was Brunelleschi.³⁵⁴ Whatever the case, the fact remains that, from its inception, linear perspective and optics were intertwined. The fact also remains that, soon after the appearance of Alberti's *Della pittura*, linear perspective was well on its way to becoming an artistic convention throughout Europe, and a succession of eminent painters from Piero della Francesca (d. 1492) to Albrecht Dürer (d. 1528) undertook to perfect the technique, as well as to extend it to the casting of light and shadow in chiaroscuro.³⁵⁵

Likewise, between 1500 and 1600 a spate of handbooks on linear perspective appeared in print, many of them devoted to architectural rather than pure artistic concerns. One of the earliest and best known of these, the *De artificiali perspectiva* of Viator (Jean Pélerin), was first published in 1503 and republished in 1509. As expected, Viator opens with a brief exposition of the optical principles that underlie his projection-scheme:

For in fact (as has been ascertained by speculative philosophers), all objects are seen as if [they were apprehended] by lines passing out from the eye: i.e., by means of a triangle, whose base is the visible object and whose axis passes over the parts of this visible object. But light does not pass out from the eye; on the contrary, from the exterior light shining on the eye, a radial breaking [*reflexio*], like that in a burning mirror, occurs; and through this radial breaking the forms of things are grasped [by sight].³⁵⁶

In other words, while sight may seem to be due to the extramission of visual rays, it is actually due to the intromission of light-rays, which are broken (i.e., refracted) at the eye and thereby grasped, presumably after

being brought toward the center of sight, just as they are brought to convergence in concave mirrors. Like Alberti, Viator concedes that, as far as the geometry of sight is concerned, the visual process can be adequately understood in terms of visual rays. Unlike Brunelleschi, he takes a definite stand in favor of intromissionism at the theoretical level. It is, incidentally, worth noting the implicit distinction drawn in the title of Viator's treatise between "artificial perspective" (i.e., linear perspective) and "natural perspective" (i.e., the subject-matter of the science of *perspectiva*) from which it derives by imitation.

In the case of linear perspective, the influence of geometrical optics (in whichever form) upon Renaissance art is as patent as it is specific. Less patent or specific, though no less important in the long run, was the way in which Perspectivist theory redounded on Renaissance art at other levels, particularly the aesthetic level. Edgerton, for example, makes a fairly good case for supposing that, in the London *Annunciation* (c. 1455), Fra Filippo Lippi was drawing directly upon Roger Bacon's theory of species-multiplication in an attempt to render Mary's impregnation by God visually palpable. Accordingly, as Edgerton describes the painting's relevant portions, the succession of overlapping circles (themselves representing spheres) that extend from God's hand to the dove poised directly in front of Mary's womb represents the multiplication of the Holy Spirit downward from heaven. The "dual sprays of golden dots [that] fan out reciprocally from the head of the dove and Mary's womb"³⁵⁷ represent the radiation of the impregnating spirit into Mary and the complementary radiation that flows out from her to complete the act of reception. And the slight aperture in Mary's dress, through which both radiations pass, represents the "pupil" through which Christ is ultimately figured in Mary's eye-like womb.³⁵⁸ Admittedly, this analysis is both conjectural and impressionistic, but it is nonetheless highly suggestive. For, if true, it indicates not only how soon, but how deeply, Perspectivist ideas became entrenched among Renaissance artists.

Even more suggestive is the thesis proposed by David Summers in *The Judgment of Sense*, because it strikes to the motivational core of Renaissance naturalism.³⁵⁹ The pivotal issue for Summers is whether the aesthetic foundations of Renaissance art are quintessentially Platonic and therefore whether Renaissance artists were conceptually driven to idealize what they portrayed according to transcendental principles of beauty.³⁶⁰ Summers responds not by denying that Renaissance art manifests Platonic ideals but by affirming that "other traditions of meaning shaped the discussion of the art of the period at its deepest levels."³⁶¹ Whatever "other traditions of meaning" may be at play here, the one

Summers has in mind is the Aristotelian tradition.

Characteristic of Aristotelianism, Summers explains in his background sketch, is a deep-seated conviction that knowledge is inductive, that it has its ultimate wellsprings in sense-experience. Sensation and its representations are therefore not to be deprecated as the bearers of falsehood (Platonism) but rather to be prized as the bearers of truth. Viewed in this way, the naturalist impulse in Renaissance art, the impulse to portray what one sees (or could imagine to see) as faithfully as possible, is fundamentally Aristotelian, not Platonist, in spirit. More to the point, according to Summers, the aesthetic foundations of Renaissance naturalism were *self-consciously* Aristotelian and therefore "deeply bound up with the Aristotelian notion that the human soul, from sensation upward, is suited to its world, and with the further notion that the beautiful itself is conformity to human sense before it is evidence of transcendental value."³⁶²

Having staked this claim, Summers devotes the remainder of his study not merely to defending it but to mining it as deeply as he can. In the process, he uncovers a wealth of pertinent sources; but his real aim is to show how those sources led the Renaissance artists who read them to an increasingly firm belief that aesthetic judgment belongs more properly to sense than to intellect. This brings us to two key questions: what did these artists mean by "sense," and how did they understand its function in aesthetic judgment? The answer to both questions is to be sought in what these artists learned from the complex of sources, including Perspectivist texts, that they read and pondered. First, it is clear that, by "sense," Renaissance artists intended something far more comprehensive than any particular sense-organ, such as the eye, or any specific sense-datum, such as color or light. What they meant was the full array of perceptual faculties incorporated into the Perspectivist account of sight, an array that includes not only the "external senses," the eye in particular, but also the succession of higher "internal senses," ranging from common sense through fantasy and imagination to reason and memory.³⁶³

Renaissance artists thus learned that "seeing" is a deeply perceptual act. They learned, as well, that it is complex act, entailing many subrational processes, such as comparison, recognition, assimilation, discrimination, and certification. They also learned that, subrational though they may be, these processes are not *irrational*; on the contrary, they are entirely logical, or "syllogistic," in form, if not in content. On this basis, finally, they learned not only that "seeing" is judgmental to the core, because it entails discrimination and adjudication at every stage, but also that, when the judgments to which it is subject are properly

carried out, "seeing" is veridical.

So taught, Renaissance artists understood full well what they needed to accomplish as painters: to portray the "truth" of what they saw (or could imagine to see) as accurately as possible according to how it was (or would be) presented to the perceiving "eye." The closer they could get to that truth, the more aesthetically pleasing the result, precisely because of its fidelity to what the thing painted actually looks like. But to achieve such a result, much less appreciate it properly, requires a discriminating eye, an eye that sees clearly and judges what it sees with unerring rectitude—the eye, in short, of the true artist. This, in a nutshell, is "the judgment of sense."

Such judgment is not merely subjective, Summers continues. Even though the artist necessarily paints from a particular point of view, we are all capable of sharing that point of view. Endowed with identical perceptual faculties and, therefore, with the capacity to see things in precisely the same way, we all have the power to see what the artist sees in his portrayal—provided, of course, that he portrays it aright and we judge it aright. Thus, the judgment of sense and its attendant aesthetic are "universal" insofar as they are common to all who are gifted with sight. That, according to Summers, is why "the union of painting and optics in one-point perspective would yield what was understood to be a most perfectly universal art, fully adapted to the structure of human vision and perception."³⁶⁴

While the judgment of sense may not be *merely* subjective, Summers cautions, it is still subjective. The "image" we have of external reality is a perceptual representation of that reality, not the reality itself. Likewise, the painted portrayal of that perceptual "image" is a representation of it, not the image itself. In order to make the portrayal adequate to its object—i.e., the perceptual image and its inherent beauty—the artist must adapt his technique to the demands of sense-judgment. Artistic technique, therefore, cannot be properly governed by rigidly followed intellectual schemes, such as linear perspective or chiaroscuro. These schemes provide useful guidelines only; they are not absolutely prescriptive. "Sometimes," Raffaele Borghini assures us in *Il riposo* of 1584, "in order to give a figure more grace it is necessary in some places to extend the measures and in others to diminish them." Moreover, he continues, "this cannot be taught; rather the artist must learn it with natural judgment."³⁶⁵ Leonardo makes much the same point in his discussion of chiaroscuro and the tonal quality of color in *On Painting*.³⁶⁶ To achieve the proper "sensible" effect in his painting, the artist must modulate, or temper, the color-contrasts he uses to convey that effect. Otherwise, in lacking appropriate harmony, the result will offend the

viewer's sensibility. Here, according to Summers, we have "good Aristotelian principles, now lifted away to [become] a principle of painting as basic as the practice of toning grounds and painting from shadow to light."³⁶⁷ Suffice to say, these Aristotelian principles show clear traces in Alhacen's analysis of beauty on the basis of proportionality, or harmony, as well as in his account of how ambient circumstances can affect the perception of both the quality and intensity of light and color.

However superficial it may be, this brief outline should nonetheless be adequate to convey the depth to which Perspectivist optics was implicated in the development of Renaissance art. Just how deeply it was implicated is still open to question, to be sure, but Summers makes a strong case for supposing that Perspectivist influence extended far beyond the application of linear perspective, that in fact it reached to the very aesthetic core of Renaissance art, and even beyond to the painterly techniques employed by Renaissance artists. At bottom, then, the representation of visual space in Renaissance art was the expression of a world-view implicit in the Perspectivist analysis of sight, a world-view based upon the "geometrization" of visual space. If, however, Alhacen and his Perspectivist followers taught Renaissance artists to "see" the world in such spatial terms, those artists in turn taught early modern thinkers to see the world in those same terms and thus to conceive of it as a Euclidean continuum. As far as the development of optics in particular, and science in general, are concerned, this way of viewing the world had crucial ramifications that have only begun to be explored.³⁶⁸ But the telling of that story lies outside the scope of this introduction.

7. Ibn al-Haytham: A Tentative Reappraisal

To evaluate Ibn al-Haytham's achievement in optics objectively, or at least dispassionately, is no easy task, in great part because of the iconic stature he has assumed in the history of science. The result has been a tendency among scholars not only to emphasize the innovative character of his theory at both the conceptual and methodological level, but also to modernize that theory, or aspects of it, out of all proportion. Much therefore that has been claimed in Ibn al-Haytham's behalf, though not necessarily untrue at the factual level, is nonetheless misleading at the interpretive level.

A particularly egregious example can be found in a recent issue of *The New York Times Magazine* devoted to "The Best Ideas, Stories and Inventions of the Last Thousand Years." According to the lead article in that issue, "Eyes Wide Open," by Richard Powers,³⁶⁹ Ibn al-Haytham

deserves credit for the millennium's best idea, an idea whose significance is trumpeted in the article's header: "When an obscure Arab scientist solved the riddle of light, the universe no longer belonged to God." By Powers' reckoning, what Ibn al-Haytham did (and herein lies the force of his idea) was usher in a new age of scientific empiricism, an age in which truth would be observationally, not theoretically, determined. Or as Powers sums it up, "the idea of looking had begun to shake the foundations of authority as the basis of thought." How did Ibn al-Haytham achieve this? By resolving "a scientific dispute [between extramissionists and intromissionists] that had remained deadlocked for more than 800 years." He reached this resolution, Powers asserts, through a set of "remarkable observations," the simplest and most remarkable of which is as follows:

He invited observers to stare at the sun, which proved the point: when you looked at a sufficiently bright object, it burned the eye. He made no appeal to geometry or theoretical necessity. Instead, he demolished a whole mountain of systematic theory with a single appeal to data. Light started outside the eye and reflected into it. No other explanation was consistent with the evidence.

Granted, this account has the twin virtues of simplicity and comprehensiveness, but these are its worst vices as well. Ibn al-Haytham did point out that looking at the sun can impair vision (not, however, by burning the eye), but he cited this as evidence that light affects sight, not as disproof that the eye emits visual rays. Nor did any of the supposed beneficiaries of Ibn al-Haytham's insight mentioned by Powers (e.g., Roger Bacon, Witelo, William of Ockham, and Kepler) take it that way. Furthermore, much of the appeal of Ibn al-Haytham's account of vision lay not in its observational core but in its systematic features—i.e., the idealized geometry of the eye, the selection of orthogonal rays by the lens, the sensitive function of the visual spirit, and so forth. It was on the basis of this appeal, in fact, that Ibn al-Haytham assumed the very status of authority that Powers would have us believe he taught western thinkers to reject.

In all fairness, I should point out that Powers is a novelist by profession, not a historian, so I do not pretend that his assessment of Ibn al-Haytham represents the scholarly consensus. But it does, I think, represent an interpretive extreme based upon the assumption, held either explicitly or implicitly by many scholars, that Ibn al-Haytham's *Kitab al-Manazir* was truly revolutionary in terms not only of its purport, but also of its import. On the one hand, in formulating his model of sight

and light, Ibn al-Haytham is supposed to have broken radically with the past. On the other, the appropriation of that model by Western thinkers is supposed to have led more-or-less inexorably to the development of modern optics. While these suppositions are not entirely groundless, they are problematic enough to warrant scrutiny before we assent to them. With that in mind, let us first address the issue of originality. Just how original was Ibn al-Haytham's theory of vision and therefore how radically might he have broken with the past in formulating it?

Take the problem of radiation. At first blush, the differences between Ibn al-Haytham's account of radiation and that of his visual-ray antecedents appear to be so sharp as to be irreconcilable. Ibn al-Haytham was unequivocal in his support of intromissionism, maintaining that visual contact between viewer and visible objects is established through the propagation of luminous color from those objects into the eye. Equally unequivocal in their support of extramissionism, his visual-ray opponents maintained that the eye establishes visual contact with external objects by propagating visual flux to them. Yet, as we noted earlier, these two positions are far from irreconcilable. For one thing, despite his disagreement with the extramissionists over the direction and type of radiation, Ibn al-Haytham preserved the basic analytic device of extramissionist optics, the visual cone, by transmuting it into a cone of vision. For another thing, according to the visual-ray theorists, Ptolemy in particular, vision is completed only when the passion of coloring is conveyed back through the visual flux to the eye. Thus, for Ptolemy, as for Ibn al-Haytham, visual perception ultimately depends upon the transmission of illuminated color from object to eye in the form of a cone. Indeed, Ibn al-Haytham's refutation of visual radiation pivots upon this point. Even for the visual-ray theorists, he contends, it is unnecessary to posit such radiation, because the complementary transmission of visual information back to the eye is perfectly sufficient. For yet another thing, Ibn al-Haytham himself did not consider the two positions to be irreconcilable. He freely acknowledged that both the intromissionists ("philosophers") and extramissionists ("mathematicians") "have something true to say and that both opinions are correct and compatible." Since, however, "neither is wholly satisfactory without the other [to complement it], . . . vision [cannot] be properly accounted for without drawing upon what both have to say."³⁷⁰ Ibn al-Haytham, of course, viewed his account as a proper melding of the two.

Still, to concede that the two models of radiation are equivalent at the mathematical level is not necessarily to deny their fundamental opposition at the physical level. Ibn al-Haytham's conception of light and color is a good case in point. Virtually all of his classical predecessors

treated light as a catalytic agent rather than as a direct object of sight. Its primary function was thus to render color visible, not to be seen in its own right. For Ibn al-Haytham, on the other hand, light was *per se* visible, seen in its own right rather than through its effect on color. The contrast between these two conceptions of light could hardly be clearer—at least in principle. In practice, though, it dwindles to virtual indistinction when we consider how Ibn al-Haytham understood the relationship between light and color. That he viewed the two as ontologically distinct is beyond question, yet, by his own account, it is in the very nature of light to mingle with color. To be physically actualized, moreover, light must shine upon, or from, an opaque body; otherwise it cannot possibly be seen. But color is what renders such bodies visible. For all practical purposes, in fact, opacity *is* color. It therefore follows that light cannot manifest itself visibly unless it alloyed with color. Nor, for that matter, can color manifest itself visibly unless it is alloyed with light, because light gives color the capacity to be seen. Thus reduced to a theoretical abstraction, pure light becomes “visible” only by inference from its effect on embodied color. Effectively denied visibility in its own right, light thus assumes the role of catalytic agent in the visual process, its primary function being to render color visible. This is precisely the same function it has for Ibn al-Haytham’s classical antecedents.

Let us turn, finally, to the issue of methodology. One of the most persistent claims in behalf of Ibn al-Haytham’s originality is that, unlike his classical predecessors, he took an overwhelmingly empirical, or inductive, tack in analyzing light and vision. That this claim has a strong basis in fact needs no belaboring. We need only call to mind the plethora of experiments adduced throughout the *Kitab al-Manazir*. Time and again Ibn al-Haytham invites us to test his assertions by isolating the phenomena in question and submitting them to confirmation (or disconfirmation) according to carefully controlled circumstances. The appropriate apparatus is generally simple (e.g., a room with one window through which light shines on selected objects), but not always, as witness the elaborate device described in book 4 for verifying that light reflects at equal angles.³⁷¹ All things considered, then, we would be hard pressed to deny not only that Ibn al-Haytham had strong empiricist leanings, but that his approach was essentially hypothetico-deductive.

So much is beyond dispute, but the real issue is whether, in following his particular path of induction, Ibn al-Haytham steered the science of optics in a new methodological direction. It is difficult to take this claim seriously in the face of Ptolemy’s relatively heavy reliance upon

empirical examples and experiment in the *Optics*. It is even more difficult in the face of Ibn al-Haytham's intimate familiarity with that work. In at least two instances, key experiments described by Ibn al-Haytham are strikingly similar to those outlined in Ptolemy's *Optics*, so similar, in fact, that there is little doubt that they are organically related. In addition, Ibn al-Haytham and Ptolemy use the very same empirical examples (e.g., a spinning top or the oculogyral illusion) to illustrate the very same points. This is not to deny that there are differences, sometimes significant ones, between Ibn al-Haytham's and Ptolemy's use of induction. Ibn al-Haytham adduced many more experiments than Ptolemy, and in those cases where the experiments are parallel, Ibn al-Haytham's are more elegant and elaborate than Ptolemy's. At bottom, though, these are differences in degree, not in kind. Ibn al-Haytham may have been more inductive than Ptolemy at the quantitative level, but certainly not at the qualitative level.

By now it should be evident that, if analyzed in terms of its conceptual elements, idea by individual idea, Ibn al-Haytham's theory of light and vision reveals very little that is new or original.³⁷² Indeed, far from breaking with the past, the *Kitāb al-Manāẓir* seems to be deeply imbedded in it. And so it is, especially when viewed in piecemeal fashion. But the *Kitāb al-Manāẓir* is not a mere agglomeration of past ideas; it is a *synthesis* and should be evaluated as such. The originality of the *Kitāb al-Manāẓir* thus lies in the way Ibn al-Haytham reformulated and honed the ideas of the past and, on that basis, incorporated them into a seamless whole. The result is a grand reconciliation of nominally disparate, often conflicting, theoretical positions, a reconciliation moreover that comes across as perfectly natural and unforced. In a sense, then, Ibn al-Haytham did transcend his past, not by overturning it but by reconfiguring and perfecting it. This is no small achievement, and the fact that it is not "revolutionary" in any meaningful way cannot detract from its underlying importance or ingenuity.³⁷³

What, then, of the subsequent impact of Ibn al-Haytham's visual theory in the Latin West; was it revolutionary? Again, I think the answer is a somewhat guarded "no." It could certainly be argued—and indeed I have argued elsewhere—that, with various Baconian elaborations, Ibn al-Haytham's model served as a sort of paradigm of visual perception for later medieval and Renaissance thinkers.³⁷⁴ Yet this model did not constitute a paradigm in the strict Kuhnian sense, because, as we know from earlier discussion, it never fully supplanted the visual-ray alternative. Furthermore, unlike the archetypal Kuhnian paradigm, Ibn al-Haytham's model of light and sight was welcomed by medieval Scholastic thinkers not in spite of its dissonance with their theoretical

preconceptions but precisely because of its consonance with them. In short, its acceptance required no suspension of deeply held belief. Not only did Ibn al-Haytham not “shake the foundations of authority” in the Latin West (as Powers would have it); he went a long way toward establishing and bolstering them.

There is of course no gainsaying the depth and breadth to which Ibn al-Haytham and his Perspectivist followers influenced medieval and Renaissance thought, not just in natural philosophy but also in theology and art. Nor is there gainsaying the fact that, without the theoretical groundwork laid by Ibn al-Haytham and his Perspectivist disciples, the revolution in optics inaugurated by Kepler and completed by Newton would have been, if not inconceivable, at least difficult to imagine. And herein lies the true significance of Ibn al-Haytham’s achievement: not that he overturned past optical tradition but that he brought it to logical perfection and, in doing so, inadvertently laid bare its vulnerability. For, as it turns out, his model of vision was flawed in at least two crucial respects. First, in supposing that the crystalline lens selects only orthogonal rays, Ibn al-Haytham misconstrued the lens’ real function, which is to bring all incoming radiation to focus on the retina. It took Kepler to correct this mistake at the beginning of the seventeenth century. Second, in supposing that light and color are ontologically distinct, Ibn al-Haytham failed to realize that, in essence, *light is color*. It took Newton to correct this mistake toward the end of the seventeenth century.

To distill Ibn al-Haytham’s achievement down to the perpetuation of these two erroneous assumptions could easily be taken as a disparagement of that achievement; so central are these assumptions to his visual model that it would be no exaggeration to say that it stands or falls upon them. No doubt it is cold comfort to point out that, within their appropriate context, both assumptions are eminently reasonable, even necessary. Cold comfort, as well, to point out that the visual model arising from them is truly awesome in its coherence, comprehensiveness, and elegance. No matter the mitigation, the fact remains that, at least in retrospect, Ibn al-Haytham was flat wrong. But if the history of science teaches us anything, it teaches us this: being wrong is not necessarily a bad thing. Quite the contrary, being wrong in the right way can be extraordinarily illuminating and, as such, can lead to extraordinarily fruitful consequences.³⁷⁵ Looked at in this way, Ibn al-Haytham’s model of vision takes on an entirely new aspect, not just as a springboard but as an all-important foil for the development of modern optics. On the one hand, in providing the key attack-points for later thinkers, such as Kepler, Descartes, Huygens, and Newton, Ibn al-Haytham dictated the

strategic lines of the ensuing battle. On the other hand, by sharpening the analytic tools of classical optics, Ibn al-Haytham supplied his attackers with the weapons they needed to destroy his synthesis to its very foundations. The irony is inescapable. In giving seventeenth-century theorists virtually everything they needed, Ibn al-Haytham can be said to have fathered the optical revolution of the seventeenth century. Yet, in doing so, he was fated, like the titans of Greek mythology, to be undone by his thankless offspring.

NOTES

¹For the most recent and most definitive account of Ibn al-Haytham's life and works, see Sabra, *Optics*, vol. 2, pp. xix-lxxiii. See also Sabra, "Ibn al-Haytham," in C. C. Gillispie, ed., *Dictionary of Scientific Biography*, vol. 6 (New York: Scribners, 1972), pp. 189-210. A German translation of Ibn Abī Uṣaybi'a's biographical account can be found in Eilhard Wiedemann, "Ibn al-Haiṭam, ein arabischer Gelehrter," *Festschrift J. Rosenthal* (Leipzig, 1906), pt. 1, pp. 147-178—also to be found in Dorothea Girke, ed., *Eilhard Wiedemann: Gesammelte Schriften zur arabisch-islamischen Wissenschaftsgeschichte*, vol. 1 (Frankfurt am Main: Insitut für Geschichte der Arabisch-Islamischen Wissenschaften an der Johann Wolfgang Goethe-Universität, 1984), pp. 117-146. Unlike Ibn al-Qiftī's account, that of Ibn Abī Uṣaybi'a contains references to a certain Abu 'Alī Muḥammed ibn al-Ḥaṣan ibn al-Haytham, whom he conflates with Abu 'Alī al-Ḥaṣan ibn al-Ḥaṣan ibn al-Haytham. Until now, no one seriously questioned this conflation, but in his recent study of Ibn al-Haytham's mathematical thought, Roshdi Rashed has argued forcefully that al-Ḥaṣan and Muḥammed were in fact two different but roughly contemporaneous figures. Much of Rashed's argument rests on distinguishing among the works credited to al-Ḥaṣan and Muḥammed according to focus: those of al-Ḥaṣan slanted specifically toward mathematical, astronomical, and optical subjects, those of Muḥammed slanted more generally toward philosophical subjects. For details, see Roshdi Rashed, *Les mathématiques infinitésimales du IXe au XIe siècle*, vol. 2 (London: Al-Furqan, 1993), pp. 1-19. For Sabra's response to Rashed, however, see "One Ibn al-Haytham or Two? An Exercise in Reading the Bio-Bibliographic Sources," *Zeitschrift für Geschichte der Arabisch-Islamischen Wissenschaften* 12 (1998): 1-40.

²See Sabra, "One Ibn al-Haytham or Two?," pp. 9-10.

³This story originates with Ibn al-Qiftī, who fails to cite its source. Ibn Abī Uṣaybi'a repeats it, giving due credit to Ibn al-Qiftī as the source; see Sabra, *Optics*, vol. 2, pp. xix-xxi for details.

⁴These details of Ibn al-Haytham's life as a scholar during his waning years are given by Ibn al-Qiftī on the basis of hearsay; see Sabra, *Optics*, vol. 2, pp. xx-xxi.

⁵Also based on hearsay, this alternative account of Ibn al-Haytham's quest for scholarly independence is provided by Ibn Abī Uṣaybi'a; see Sabra, *Optics*, vol 2, p. xxii.

⁶The *terminus a quo* of 1021 is based upon the death of al-Ḥakim and is therefore only as credible as the account of Ibn al-Haytham's acceptance of al-Hakim's invitation to supervise the project for regulating the Nile's flow. To complicate matters, there is yet a third account of Ibn al-Haytham's trip to Egypt. According to this account, when Ibn al-Haytham presented his plan to al-Ḥakim

upon their first meeting, the latter rejected it out of hand in an apparent fit of anger. Realizing that his life was in jeopardy, Ibn al-Haytham immediately fled to Syria. As Sabra observes, this story lacks credibility because it implies that Ibn al-Haytham did not settle in Egypt, a conclusion that flies in the face of rather compelling evidence that he did; see Sabra, *Optics*, vol. 2, p. xxxi. Rashed, however, contends that the apparent inconsistency here is due to Ibn Abī Uṣaybi'a's confusion of al-Ḥaṣan, who indeed settled in Cairo, and Muḥammed, who passed his scholarly career in Baghdad; see Rashed, *Les mathématiques infinitésimales*, pp. 11-12.

⁷Both Ibn al-Qiftī and Ibn Abī Uṣaybi'a provide lists of Ibn al-Haytham's works, but Ibn Abī Uṣaybi'a's is the more extensive. His list is included in Wiedemann's 1906 study, which is cited in note 1 above. For a complete catalogue of the works listed by the two biographers, see Giorgio Nebbia, "Ibn al-Haytham nel millesimo anniversario della nascita," *Physis* 9 (1967): 165-214. Nebbia cites a total of 212 works according to three groupings, but there is clearly overlap among those groupings, so some entries are repeated. For updates to Nebbia's list, see Sabra's biographical entry, "Ibn al-Haytham," pp. 205-208. It is in the brief autobiographical account provided by Ibn Abī Uṣaybi'a that Ibn al-Haytham mentions the loss of certain of his works; see Sabra, *Optics*, vol. 2, p. xxiv. According to Rashed's account, however, al-Ḥaṣan was responsible for only about half of the works credited to him by Ibn Abī Uṣaybi'a, the rest having been produced by Muḥammed. For Rashed's list of works properly ascribed to al-Ḥaṣan, see *Les mathématiques infinitésimales*, pp. 511-535.

⁸See Sabra, *Optics*, vol. 2, pp. xxiv-xxxii for a discussion of these works and their basic chronological order.

⁹Aside from commentaries on Aristotle's *De anima* and *Poetics*, Ibn al-Haytham is credited with two commentaries on Porphyry, whose *Isagoge* ("Introduction") to Aristotle's logical works (late fourth century) was translated into Latin by Boethius (d. 525) and, in that form, was enormously influential in the Latin West during the early Middle Ages. Several additional commentaries attributed to Ibn al-Haytham bear on issues that come to focus in Aristotle. See, e.g., entries I.b.1-4, I.b.11-12, I.b.20, 1.b.22, I.b.42, II.1, II.2, and II.16-17 in Nebbia, "Ibn al-Haytham," pp. 176-182.

¹⁰See Sabra, *Optics*, vol. 2, pp. xxxii-liii, for a full accounting of these nineteen works.

¹¹For this and the following two titles, see Sabra, *Optics*, vol. 2, pp. xxxii-xxxiii. The loss of this particular work is especially unfortunate, since Ptolemy's *Optics* was a crucial formative source for Ibn al-Haytham. The title of this missing work indicates that the Arabic version of the *Optics* available to Ibn al-Haytham by the early eleventh century was already defective in the same way as the version available to its Latin translator, Eugene of Sicily, around the mid-twelfth century; see A. Mark Smith, *Ptolemy's Theory of Visual Perception*, Transactions of the American Philosophical Society, 86.2 (Philadelphia: American Philosophical Society, 1986), pp. 5-8.

¹²Ptolemy alludes to the Moon Illusion in at least three works, all of which

could have been known to Ibn al-Haytham. The earliest of these allusions occurs in the *Almagest*, where Ptolemy imputes the apparent enlargement of celestial objects at the horizon to the magnification caused by refraction through atmospheric vapors. Later, in the *Planetary Hypotheses* and *Optics*, he seems to accept that this apparent enlargement is merely apparent, being rooted in the psychology of misperception rather than in physics. See Sabra, "Psychology versus mathematics: Ptolemy and Alhazen on the moon illusion," in Edward Grant and John Murdoch, eds., *Mathematics and its applications to science and natural philosophy in the Middle Ages* (Cambridge: Cambridge University Press, 1987), pp. 217-247.

¹³For a discussion of how Ibn al-Haytham's explains the Moon Illusion in his "Commentary and Summary of the *Almagest*," see Sabra, *Optics*, vol. 2, pp. xxxiv-xxxvii. Not only does Ibn al-Haytham revisit the Moon Illusion in the *Kitāb al-Manāẓir*, but several of his subsequent works are devoted to it as well; see, e.g., entries 10-12 in the listings on p. xvii above.

¹⁴Entry 1 has been translated into German by Eilhard Wiedemann in "Ibn al-Haitams Schrift über die sphärischen Hohlspiegel," *Bibliotheca Mathematica*, ser. 3, 10 (1909-1910): 293-307—also to be found in *Gesammelte Schriften*, vol. 1, pp. 354-368. It has since been translated into English by H. J. J. Winter and W. 'Arafat in "A Discourse on the Concave Spherical Mirror of Ibn al-Haitham," *Journal of the Royal Asiatic Society of Bengal*, ser. 3, 16 (1950): 1-16. Entry 2 has been translated into German by J. L. Heiberg and Eilhard Wiedemann in "Ibn al-Haitams Schrift über parabolische Hohlspiegel," *Bibliotheca Mathematica*, ser. 3, 10 (1909-1910): 201-218—also to be found in *Gesammelte Schriften*, vol. 1, pp. 369-405. It has since been translated by H. J. J. Winter and W. 'Arafat in "Ibn al-Haitham on the Paraboloidal Focussing Mirror," *Journal of the Royal Asiatic Society of Bengal*, ser. 3, 15 (1949): 25-40. Entry 3 is extant in manuscript form but as yet remains unedited and untranslated.

¹⁵Entry 4 has been translated into German by Karl Kohl, "Über das Licht des Mondes, eine Untersuchung von Ibn al-Haitham," *Sitzungsberichte der Physikalisch-medizinischen Sozietät in Erlangen* 56-57 (1924-25): 305-398. Entry 5 exists in a German translation by Eilhard Wiedemann, "Über das Licht der Sterne nach Ibn Al Haitham," *Wochenschrift für Astronomie, Meteorologie und Geographie*, ns, 33 (1890): 129-133—also to be found in *Gesammelte Schriften*, vol. 1, pp. 80-84. An Arabic edition of entry 6 has been published by A. I. Sabra in *Journal for the History of Arabic Science* 1 (1977): 5-19.

¹⁶Entry 7 is currently lost. A German translation of entry 9 can be found in J. Baermann, "Abhandlung über das Licht von Ibn al-Haitam," *Zeitschrift der Deutschen Morgenländischen Gesellschaft* 36 (1882): 195-237. An English rendering of Baermann's German translation is to be found in Thomas Shastid, "History of Ophthalmology," in Casey A. Wood, ed., *The American Encyclopedia and Dictionary of Ophthalmology*, vol. 11 (Chicago, 1917), pp. 8701-8717. A recent French translation by Roshdi Rashed is to be found in "Le 'Discours de la Lumière' d'Ibn al-Haytham (Alhazen)," *Revue d'histoire des sciences et de leurs applications* 21 (1968): 197-224.

¹⁷Entry 10 remains unedited and untranslated. Only a small part at the end of entry 11 is devoted to Ptolemy's optical thought. The relevant passages have been published in English translation by A. I. Sabra in "Ibn al-Haytham's Criticisms of Ptolemy's *Optics*," *Journal of the History of Philosophy* 4 (1966): 145-149; the Arabic text of the entire treatise has been edited by A. I. Sabra and N. Shehabi, *"Ibn al-Haytham, Al-Shukūk 'Alā Ballāmya* (Cairo: National Library Press, 1971), and an English translation of the whole treatise is to be found in Don L. Voss, "Ibn al-Haytham's Doubts Concerning Ptolemy: A Translation and Commentary" (PhD dissertation, University of Chicago, 1985). For an edition and English translation of part of entry 12, see Sabra, "On Seeing the Stars, II: Ibn al-Haytham's 'Answers' to the 'Doubts' Raised by Ibn Ma'dan," *Zeitschrift für Geschichte der Arabisch-Islamischen Wissenschaften* 10 (1995/96): 1-59.

¹⁸Extant in Arabic but unedited and untranslated, Ibn al-Haytham's "Treatise on the Rainbow and Halos" also exists in a recension by Kamāl al-Dīn al-Fārisī in his *Tanqīḥ al-Manāẓir*. For a paraphrase of this recension, see Eilhard Wiedemann, "Theorie des Regensbogens von Ibn al Haiṭam," *Sitzungsberichte der Physikalisch-medizinischen Sozietät in Erlangen* 46 (1914): 39-56—also found in Wiedemann, *Aufsätze zur arabischen Wissenschafts-Geschichte*, vol. 2 (Hildesheim: Georg Olms, 1970), pp. 69-86. Ibn al-Haytham's "Treatise on the Quality of Shadows" also exists in a recension by Kamāl al-Dīn al-Fārisī in his *Tanqīḥ*. For a German translation of this recension, see Eilhard Wiedemann, "Über ein Schrift von Ibn al Haiṭam 'Über die Beschaffenheit der Schatten,'" *Sitzungsberichte der Physikalisch-medizinischen Sozietät in Erlangen* 39 (1907): 226-248—also to be found in *Aufsätze*, vol. 1, pp. 377-399. Like the previous two works, Ibn al-Haytham's "Treatise on the Form of the Eclipse" exists in a recension by Kamāl al-Dīn al-Fārisī in his *Tanqīḥ*. For a German translation of this recension, see Eilhard Wiedemann, "Über die *Camera obscura* bei Ibn al Haiṭam," *Sitzungsberichte der Physikalisch-medizinischen Sozietät in Erlangen* 46 (1914): 155-169—also to be found in *Aufsätze* II, pp. 85-101.

¹⁹For specifics, see Sabra, *Optics*, vol. 2, p. xxvi.

²⁰This assumption would follow in any case from the mature nature of the *Kitāb al-Manāẓir*.

²¹Of particular interest in Ibn al-Haytham's treatment of mirrors is his solution of what came to be known as "Alhazen's Problem" in the seventeenth century. As posed by Christiaan Huygens, the problem boils down to finding the point of reflection on the surface of a spherical mirror when a center of sight and an object-point are given. For further discussion, see A. I. Sabra, "Ibn al-Haytham's Lemmas for Solving 'Alhazen's Problem,'" *Archive for History of Exact Sciences* 26 (1982): 299-324.

²²It is at the very end of the seventh book that Ibn al-Haytham revisits the problem of the Moon Illusion; for an English translation of this section of the Arabic text, see Sabra, "Psychology versus mathematics," pp. 237-243

²³See items 1, and 2 on p. xvii above.

²⁴See item 13 on p. xvii above

²⁵See Sabra, *Optics*, vol. 2, pp. xxxii, liii, and lx-lxi.

²⁶See Smith, *Ptolemy's Theory*, pp. 49-55.

²⁷Kamāl al-Dīn is perhaps best known in the West for his analysis of the rainbow, which was roughly contemporary with, and certainly independent of, that of Theodoric of Freiberg; see Carl B. Boyer, *The Rainbow: From Myth to Mathematics* (New York: Yoseloff, 1959), pp. 127-130. For a general discussion of the *Tanqīh* and its role in bringing Ibn al-Haytham to general scholarly attention within the Arab world, see Sabra, *Optics*, vol. 2, pp. lxiv-lxxiii. As Sabra observes, the importance of the *Tanqīh* as mediator for the *Kitāb al-Manāẓir* is witnessed by the relative numbers of surviving manuscripts of each: at least twelve for the *Tanqīh* as opposed to only five (of which four are incomplete) for the *Kitāb al-Manāẓir*.

²⁸See Sabra, *Optics*, vol. 2, p. xxv.

²⁹A critical Latin edition of this text is to be found in Heiberg and Wiedemann, "Ibn al Haiṭams Schiff über parabolische Hohlspiegel," pp. 218-237.

³⁰For a Latin text drawn from one manuscript, see José Maria Millás Vallicrosa, *Las traducciones orientales en los manuscritos de la Biblioteca Catedral de Toledo* (Madrid, 1942), appendix 2, pp. 285-312. A German translation from an Arabic version can be found in Karl Kohl, "Über den Aufbau der Welt nach Ibn al Haiṭam," *Sitzungsberichte der Physikalisch-medizinischen Sozietät in Erlangen*, 54-55 (1922-1923): 140-179. An Arabic edition with English translation is to be found in Y. Tzvi Langermann, *Ibn al-Haytham's On the Configuration of the World* (New York: Garland, 1990). Rashed, *Les mathématiques infinitésimales*, pp. 490-491, argues that this work should be attributed not to al-Ḥaṣan but rather to Muḥammed Ibn al-Haytham; see note 1 above.

³¹In proposition IV.20 of the *De triangulis*, Jordanus of Nemore adverts to "19 quinti perspective," which Marshall Clagett takes by context to be a somewhat mangled reference to proposition 34 (not 19) of the fifth book of the *De aspectibus*. If this conclusion is correct, and assuming that the *De triangulis* is an authentic work of Jordanus, then it may date to before the 1230s, although there is no certainty about Jordanus' actual dates. For Jordanus' actual citation, see Clagett, *Archimedes in the Middle Ages*, vol. 1 (Madison: University of Wisconsin Press, 1964), pp. 668-669 and 674; for later reservations about Jordanus' dates, see Clagett, *Archimedes in the Middle Ages*, vol. 5 (Philadelphia: American Philosophical Society, 1984), pp. 297-301.

³²See R. James Long, ed., *Bartholomaeus Anglicus, De proprietatibus rerum, Books 3-4: On the Properties of Soul and Body* (Toronto: Pontifical Institute of Mediaeval Studies, 1979). Long suggests a twenty-year span, between 1230 and 1250, within which Bartholomaeus may have been occupied in compiling the *De proprietatibus rerum*; see pp. 4-5. For references to Alhacen ("auctor perspective"), see *De proprietatibus rerum*, III.17 ("De virtute visibili"), pp. 39-45.

³³Robert Grosseteste, whom Roger Bacon extols for his mastery of optics, evidently had no access to the *De aspectibus* when he composed his optical treatises sometime during the first half of the 1230s; see Richard C. Dales, "Robert Grosseteste's Scientific Works," *Isis*, 52 (1961): 394-402. Given his intense interest in optics, Grosseteste would surely have taken full advantage of the *De*

aspectibus had a copy been available to him at that time.

³⁴For a discussion of this Italian translation, see "Manuscripts and Editing," p. clx below.

³⁵For this list, which includes eighty-seven works, see George Sarton, *An Introduction to the History of Science*, vol. 2 (Baltimore: Williams & Wilkins, 1927), pp. 339-344,

³⁶This work does figure in the list of Gerard's works; see *ibid.*, p. 342.

³⁷The title of Nuñez' work is *De crepusculis liber unus, . . . Item Allacen . . . De causis crepusculorum liber unis, a Gerardo Cremonensi iam olim latinitate donatus*. . . (Lisbon, 1542). Friedrich Risner's title for the *De crepusculis* is "Alhazen filii Alhayzen de crepusculis et nubium ascensionibus liber unus, Gerardo Cremonensi interprete"; see *Opticae thesaurus*, p. 283.

³⁸See Sarton, *Introduction*, p. 342; note that Sarton, following Nuñez and Risner, misattributes this work to Ibn al-Haytham.

³⁹See A. I. Sabra, "The Authorship of the *Liber de crepusculis*, an 11th-Century Work on Atmospheric Refraction," *Isis* 58 (1967): 77-85. For a recent edition of the Latin version of this treatise, see A. Mark Smith, "The Latin Version of Ibn Mu'ādh's Treatise 'On Twilight and the Rising of Clouds,'" *Arabic Sciences and Philosophy* 2 (1992): 83-132. For editions of the medieval Hebrew and Italian versions, see A. M. Smith and Bernard R. Goldstein, "The Medieval Hebrew and Italian Versions of Ibn Mu'ādh's 'On Twilight and the Rising of Clouds,'" *Nuncius* 8 (1993): 613-643.

⁴⁰See "Manuscripts and Editing," pp. clxviii-clxix below for further discussion.

⁴¹For a detailed analysis of these changes and their ramifications, see "Manuscripts and Editing," pp. clxviii-clxx below.

⁴²See Sabra, *Optics*, vol. 2. p. lxxiii

⁴³*De aspectibus* should be translated as "On appearances" if *manāẓir* is taken as the plural of *manẓar* = "appearance." However, Sabra notes that in this case *manāẓir* is intended as the plural not of *manẓar*, but of *manāẓara* = "that by means of which vision is effected." Hence, according to Sabra's account, *manāẓir* is best translated as "optics" (*optika* = "having to do with the eye") rather than as "appearances," a point that apparently went unnoticed by the Latin translator(s); see Sabra, "Ibn al-Haytham," p. 203, n. 9.

⁴⁴The opening title, ALHACEN PERSPECTIVA, that occurs at the very beginning of ms *P1* (see entry 5 in "Manuscripts and Editing," p. clvi below) is clearly added by a later hand. Reference to "perspectiva Alhacen" in the colophon to ms *E* (see entry 1 in "Manuscripts and Editing," p. clv below), is in the hand of the corrector, Guido de Grana, not the original scribe. Finally, ms *L1* and the fourteenth-century Italian version of the text (see entries 13 and 18 in "Manuscripts and Editing," pp. clx and clx below) end with the following explicit: "Explicit liber Alacen in scientia perspectiva," but in both cases "perspectiva" is obviously intended not as a title but as a descriptive term. There is, of course, no denying that the *De aspectibus* was commonly cited as *Perspectiva* by medieval and Renaissance commentators, but this title was prob-

ably conferred upon it generically, according to subject-matter and approach (mathematical optics = *perspectiva*).

⁴⁵Alhacen's full name is Abū 'Alī al-Ḥaṣan ibn al-Ḥaṣan ibn al-Haytham, "al-Ḥaṣan" being his given name. Assuming that the "c" is soft, the "h" is aspirated, and the stress is on the second syllable, then "Alhacen" constitutes an accurate Latin transliteration of "al-Ḥaṣan."

⁴⁶I know of only one place--in the sixteenth-century Paris manuscript described under entry 16, p. clx below--where "Alhazen" is used, but not to designate Ibn al-Haytham's given name. It appears in the following incipit: *Incipit primus tractatus Alhacen filii Alhazen de aspectibus et 7 sunt differentie*. Might this be one of the two manuscripts Risner claims to have drawn upon for his edition? Perhaps so, given that the manuscript in question falls squarely within the family-tradition from which Risner drew. It bears noting that, unlike any of the manuscript-sources, Risner further Latinizes "Alhazen" by adding "us" as a suffix in order to make it declinable (i.e., Alhazenus, Alhazeni, etc.).

⁴⁷If we add the Italian translation to the account, then the total of manuscripts dating to the fourteenth century rises to ten.

⁴⁸For details on the composition and dissemination of these derivative works, see pp. lxxxii-lxxxiii above.

⁴⁹Friedrich Risner was taken under Petrus Ramus' wing at Paris as a young man. It was, as he tells us in the preface to the *Opticae thesaurus*, at Ramus' behest that he decided to edit Alhacen's work; see David Lindberg's preface to the Johnson Reprint edition of the *Opticae thesaurus* (New York, 1972), p. xxvii.

⁵⁰For a discussion of this tripartition into subfamilies, see "Manuscripts and Editing," pp. clxi-clxvii below.

⁵¹The six manuscripts in question are listed as entries 1, 2, 4, 12, 13, 16, and 17 in "Manuscripts and Editing," pp. clv-clvi and clx-clx below.

⁵²The omission of these three chapters reduces the size of the first book by nearly half. Furthermore, it is in these three chapters that Ibn al-Haytham establishes certain methodological norms while laying the foundations for his later analysis of light- and color-radiation; see Sabra, *Optics*, vol. 2, pp. 3-41.

⁵³See table 1 of appendix 2, pp. 653-654 below, for a breakdown of chapters by manuscript-groups.

⁵⁴There is absolutely no indication in any of the manuscripts that the translator thought he was taking up his task *in medias res*. Furthermore, there are very few explicit cross-references within the extant text to indicate any missing portion even though the work, as a whole, abounds with cross-references. Most of these, however, are allusive rather than explicit, the common form being "It has already been demonstrated that. . ." Although in hindsight we can see that several of these cross-references do refer to passages located in the missing portion, we can still key them in one way or another to places in the five chapters that have actually come down to us.

⁵⁵As can be seen from table 1 of Appendix 2, pp. 653-654 below, the number of chapters ranges fairly widely: of the sixteen texts (including Risner's) that

have book 1 in its entirety, five contain seven chapters, six contain eight, four contain nine, and one contains ten. That book 1 of the Latin version was originally divided into nine chapters follows from my analysis of the manuscripts and subsequent conclusions about which manuscripts are most representative of the *Urtext*; see “Manuscripts and Editing,” p. clxix below for details.

⁵⁶From table 1 of Appendix 2, pp. 653-654 below, it can also be seen that, even when there is agreement among manuscripts about the number of chapters, there is not always agreement about their placement. Thus, for example, among the six manuscripts containing eight chapters, there are three different patterns of subdivision.

⁵⁷For details on these discrepancies in number and placement, see tables 2 A, 2B, 3A, and 3B of Appendix 2, pp. 654-657 below.

⁵⁸For a complete breakdown of the divisions and subdivisions within book 3, see tables 4 and 5 of Appendix 2, pp. 658-659 below.

⁵⁹Book 4 is divided into six chapters in seven of the manuscripts; in all the remaining manuscripts it is divided into five chapters. In book 5, the number and placement of chapters is quite variable, even though the prologue specifies quite clearly that the book consists of two chapters. In book 6, the number and placement of chapters is also variable, but not to the same extent as book 5. Book 7, on the other hand, is divided fairly consistently into seven chapters, there being only one exception, which has it divided into six. See tables 6-7 of Appendix 2, pp. 660-661 below, for details.

⁶⁰In Sabra’s English translation of the Arabic text, the first three chapters of book 3 occupy 31 pages, the remainder of the book 108. In the Latin text, on the other hand, the first three chapters of book three occupy 33 pages whereas the remainder of the book occupies only 30 pages. Thus, *mutatis mutandis*, the second portion of the book in the Latin version is roughly one-quarter the size of the same portion in the Arabic version.

⁶¹See, e.g., I, 5.39, p. 22, line 34; I, 6.6, p. 23, line 45; I, 6.14, p. 27, line 141; I, 6.43, p. 42, line 26; I, 6.76, p. 55, line 91; and II, 3.71, p. 126, line 256.

⁶²See Nebbia, “Ibn al-Haytham,” pp. 179 -180, for a full listing of the commentaries upon various Galenic works attributed to Ibn al-Haytham.

⁶³See Nebbia, “Ibn al-Haytham,” entry 1.b.4, p. 176.

⁶⁴For example, after an extensive critique of the visual-ray theory (as exemplified in the Euclidean analysis), Alhacen concludes in I, 6.61, p. 374 below, that “what we have shown—namely, how vision takes place—conforms to the opinion of those who have verified it on mathematical grounds as well as [those who have verified it] on physical grounds. It has been shown therefore that both parties have something true to say and that both opinions are correct and compatible, but neither is wholly satisfactory without the other [to complement it], nor can vision be properly accounted for without drawing upon what both have to say.”

⁶⁵This reconciliation-process was already well underway in late Antiquity, for instance, with the efforts of various Neoplatonist commentators to interpret

the works of Aristotle critically in the light of their Platonist leanings.

⁶⁶For color as the proper object of sight, see *De anima*, 2, 6.418a11-14; for Aristotle color is an inherent quality of physical objects, not a mere visual affect, or psychological effect, created by the interaction of matter in various forms and sizes; see *De anima*, 2, 7.418a29-419a20. In taking this position, Aristotle is arguing against not only the atomists, but also Plato; see, e.g., *Timaeus* 67d-e.

⁶⁷As Aristotle puts it in *De anima*, 2, 7.418b11-12, "light is as it were the proper colour of what is transparent and exists whenever the potentially transparent is excited to actuality by the influence of fire," trans. J. A. Smith, in Jonathan Barnes, ed., *The Complete Works of Aristotle: The Revised Oxford Translation* (Princeton: Princeton University Press, 1984), p. 666.

⁶⁸The transmission of color through transparent media is a matter of a formal transformation of that medium, one that occurs instantaneously in much the same way that water is transformed all at once into ice; see *De sensu et sensato*, 6, 447a2-3.

⁶⁹For Aristotle's use of the seal-and-wax analogy to explain visual impression, see *De anima*, 3, 12.434b29-435a10.

⁷⁰For Aristotle's discussion of the common sensibility and the common sensibles, see *De anima*, 3.1.

⁷¹*De anima*, II, 6, 418b 20-23.

⁷²For an extensive discussion of the psychological/perceptual basis of Aristotle's epistemology, see Michael V. Wedin, *Mind and Imagination in Aristotle* (New Haven: Yale University Press, 1988).

⁷³For example, despite his championing of intromissionism in the *De anima* and *De sensu et sensato*, Aristotle's analysis of the rainbow and other "meteorological" phenomena in *Meteorology*, 3.2-5 is based on rays sent out by the eye.

⁷⁴Euclid's *Optics* opens as follows: "Let it be supposed: (1) that straight lines diverge outward from the eyes to comprehend vast spaces, (2) that these visual rays form a cone whose vertex is located in the eye and whose base is formed at the boundaries of visible objects, (3) that objects with which the visual flux makes contact are seen, whereas those objects not contacted by the visual flux are not seen" (from A. Mark Smith, *Ptolemy and the Foundations of Ancient Mathematical Optics*, Transactions of the American Philosophical Society, 89.3 (Philadelphia: American Philosophical Society, 1999), p. 51).

⁷⁵As Euclid puts it in the fifth and sixth postulates of the *Optics*, "Objects seen with higher rays appear higher, whereas those seen with lower rays appear lower; and objects seen with right-hand rays appear to the right, whereas those seen with left-hand rays appear to the left" (from Smith, *Ptolemy and the Foundations*, p. 55). The perception of shape is implicit rather than explicit in Euclid's model—e.g., in the notion expressed in the second postulate that the base of the visual cone is delineated by the boundaries of objects.

⁷⁶Euclid's fourth postulate asserts that "objects viewed under a larger angle appear larger, whereas those viewed under a smaller angle appear smaller, and those viewed under equal angles appear equal" (from Smith, *Ptolemy and the*

Foundations, p. 56).

⁷⁷This notion of the tactile sensing of motion by ray-ends is implicit in props. 49-51 and 53-55 of the *Optics*.

⁷⁸Euclid deals with such variation in visual acuity in the second and third propositions of the *Optics*.

⁷⁹In the first proposition of the *Optics*, however, Euclid asserts that, in order for any object to be seen in its entirety, it must be scanned by the visual flux, which implies that clear vision occurs only within a narrow region of the visual cone's base, presumably toward its core, which is centered on the visual axis.

⁸⁰*Optics*, II, 20, in Smith, *Ptolemy's Theory*, p. 78.

⁸¹*Optics*, II, 20, in *ibid.*, p. 78.

⁸²*Optics*, II, 19, in *ibid.*, pp. 76-77.

⁸³*Optics*, II, 20, in *ibid.*, pp. 77-78. Presumably, the increasing "absence" of rays is due to the spreading out of the impinging flux over the frontal plane of the visual field.

⁸⁴*Optics*, II, 50, in *ibid.*, pp. 91-92.

⁸⁵"Indeed, colors are never seen in darkness, except for [the color of] an object that shines from inherent whiteness or that is exceedingly polished, for each of these is a case of brightness, and brightness is a kind of luminosity," *Optics*, II, 5, in *ibid.*, pp. 71-72.

⁸⁶See *ibid.*, pp. 29-30.

⁸⁷"Colors are primarily visible, because nothing, besides light, that does not have color is seen. Still, colors are not intrinsically visible, since colors are somehow contingent on the compactness of bodies and are not visible *per se* without light. All the rest of the . . . visible properties are secondarily visible, because the visual faculty apprehends things as bodies by means of their [inherent] colors and characteristics, whereas objects that have no compactness, but are exceedingly tenuous and have no color, are neither sensed nor perceived as bodies by the visual faculty. Furthermore, size, place, and shape are perceived only through the mediation of bodies' surfaces, which coincide with the colors upon which external light falls. Activity and rest, as well, are apprehended by means of an alteration, or lack thereof, in any of the aforementioned visible properties;" *Optics*, II, 5, in *ibid.*, pp. 71-72. Note that Ptolemy's secondary visibles are, in essence, Aristotle's common sensibles.

⁸⁸Ptolemy is thus arguing against both the atomists and Plato; see *ibid.*, p. 27.

⁸⁹" . . . since light and visual flux strike the surfaces of bodies together, it is quite appropriate that the first thing to be sensed in all visible objects is a characteristic of their surfaces. And color is more properly attributed to the surface than to the interior of things. For this reason, the ancients used to equate surface and color, because color is a certain property affixed to the substance of an illuminated thing, and the genus "surface" is like that; and so it is an apt designation for it. As far as the remaining visible properties are concerned, corporeity is not surface, because surface is its boundary, yet all the remaining visible prop-

erties depend upon something in bodies having to do with surface. For instance, size is the boundary of a surface's quantity, whereas shape is a qualitative arrangement of surface, and place is the boundary of the location of a surface. Activity, though, depends upon surface insofar as it is attributed to any of those properties [i.e., size, shape, and place]—for instance, the activity of alteration, or of growth, or of diminution, or of locomotion;" *Optics*, II, 13, in Smith, *Ptolemy's Theory*, p. 74.

⁹⁰*Optics*, II, 25 and 47 in *ibid.*, pp. 81-82 and 90.

⁹¹*Optics*, II, 57, in *ibid.*, p. 95.

⁹²This is the underlying point of Euclid's analysis in propositions 34-36 of his *Optics*.

⁹³*Optics*, II, 124, in Smith, *Ptolemy's Theory*, p. 120; see also *Optics*, II, 126, in *ibid.*, p. 121.

⁹⁴*Optics*, II, 67, in *ibid.*, p. 99.

⁹⁵*Optics*, II, 129, in *ibid.*, p. 122.

⁹⁶"We are naturally disposed to turn our raised eyes unconsciously in various directions with a remarkable and accurate motion, until both eyes converge on the middle of a visible object, and both cones form a single base upon the visible object they touch," *Optics*, II, 28, in *ibid.*, p. 83.

⁹⁷For Ptolemy's analysis of image-doubling in diplopia, see *Optics*, II, 27-46, in *ibid.*, pp. 82-90.

⁹⁸Elsewhere, I have contrasted Ptolemy and Euclid according to methodological commitment, seeing in Euclid an example of instrumentalism or positivism (i.e., having no concern for whether his analytic model reflects physical reality) and in Ptolemy an example of realism (i.e., believing his visual model to reflect physical reality); see A. Mark Smith, "The Physiological and Psychological Grounds of Ptolemy's Visual Theory: Some Methodological Consideration," *Journal of the History of the Behavioral Sciences* 34 (1998): 231-46.

⁹⁹Ptolemy describes the apparatus for analyzing diplopia in *Optics*, II, 30, and III, 43, in Smith, *Ptolemy's Theory*, pp. 83 and 147. The apparatus for analyzing reflection is described in *Optics*, III, 8-10, in *ibid.*, pp. 135-135. The apparatus for analyzing refraction is described in *Optics*, V, 8-9, 14, and 29, in *ibid.*, pp. 232, 234, and 236-237.

¹⁰⁰The two primary extant sources for Galen's thought on the anatomy and physiology of sight, as well as on the visual act itself, are books 8-10 of the *De usu partium*, translated by Margaret Talmadge May, *Galen on the Usefulness of the Body* (Ithaca, NY: Cornell University Press, 1968), pp. 384-503, and book 7 of the *De placitis Hippocratis et Platonis*, trans. Phillip De Lacy, *Galen on the Doctrines of Hippocrates and Plato*, *Corpus Medicorum Graecorum* 4, 4, 1, 2 (Berlin: Akademie Verlag, 1980-84), pp. 428-479.

¹⁰¹*De usu partium*, X, ii, 94, in May, p. 491

¹⁰²*De usu partium*, X, ii, 55, in *ibid.*, p. 463.

¹⁰³"The vitreous humor," Galen asserts, "is moist like fused glass and [only] as clear as you would expect a substance to be if a little black were mixed with

a large clear body and the perfection of its clearness were impaired throughout," *De usu partium*, X, ii, 56, in *ibid.*, p. 464.

¹⁰⁴*De usu partium*, X, ii, 55-61, in *ibid.*, pp. 463-468.

¹⁰⁵*De usu partium*, X, ii, 61-62, in *ibid.*, pp. 468-469.

¹⁰⁶*De usu partium*, X, ii, 62-66, in *ibid.*, pp. 469-472.

¹⁰⁷The term *ooeides*, meaning "egg-like," is presumably meant to indicate that this humor is like albumen in its transparency—a comparison reflected in the Latin term *albugineus* that is applied to this humor.

¹⁰⁸*De usu partium*, VII, i, 465, in May, p. 402. "Accordingly," Galen concludes, "the encephalon extends a part of itself [via the optic nerves] to the crystalline humor in order to know how it is being affected, and this outgrowth is properly the only one to have a perceptible channel, because it alone contains a very large amount of the psychic pneuma."

¹⁰⁹*De placitis*, 7, 3.23-26, in De Lacy, pp. 445-447.

¹¹⁰*De usu partium*, X, ii, 56-59, in May, pp. 465-467.

¹¹¹*De placitis*, 7, 3.4-22, in De Lacy, pp. 441-445.

¹¹²See the quotation on the following page.

¹¹³*De placitis*, 7, 7.19, in De Lacy, p. 475

¹¹⁴"Here," Galen asserts, "Aristotle was quite correct when he said about the sudden change of bodies thus altered that it is very nearly instantaneous, and also, with regard to this alteration, that it is in the nature of bright air, when altered by colors, to transmit the alteration all the way to the organ of sight," *De placitis*, 7, 7.4, in De Lacy, p. 471.

¹¹⁵Galen cites Plato's claim in *Timaeus* 45b-d that what is emitted by the eye into the air is a sort of fire, but one that is so gentle as not to burn; see *De placitis*, 7, 6.3-4, in *ibid.*, p. 463.

¹¹⁶*De placitis*, 7, 5.33-37, in *ibid.*, p. 461.

¹¹⁷*De placitis*, 7, 7.24, in *ibid.*, p. 467.

¹¹⁸See esp. *De usu partium* X, ii, 95 in May, p. 492.

¹¹⁹"Now if you care to stand [facing] a pillar," Galen suggests, "and open and close each eye in turn while gazing steadily at it, it will seem to jump from one place to another; if it is the right eye you close, the pillar jumps to that side, and if it is the left, it jumps to the other side. Moreover, if you open the right eye, the pillar will seem to jump to the left, and if you open the left one, it will seem to jump to the right; [but] if you look with both eyes at once, it seems to occupy a place midway between the places it appears to occupy to each eye separately," *De usu partium* X, ii, 100, in May, p. 496.

¹²⁰*De usu partium*, X, ii, 110 in *ibid.*, p. 502.

¹²¹For Galen's discussion of diplopia, see *De usu partium* X, ii, 99-104 in *ibid.*, pp. 495-498.

¹²²See, e.g., *De usu partium*, VII, i, 448-451 in May, pp. 388-391.

¹²³See *De placitis* 7, 7.20, in De Lacy, p. 475.

¹²⁴*De placitis* 7, 7.20, in *ibid.*, p. 475.

¹²⁵For a brief discussion of Ptolemy's putative sources and the historiography of their analysis, see Smith, "The Physiological and Psychological Grounds of Ptolemy's Visual Theory," pp. 241-242. See also Smith, *Ptolemy's Theory*, pp. 14-18.

¹²⁶See *Ibid.*, pp. 28-29.

¹²⁷Diophantus' dates are problematic, but Heath's dating to the mid-third century is currently accepted; see T. L. Heath, *Diophantus of Alexandria*, 2nd ed. (1910; reprint, New York: Dover, 1964), pp. 1-2. Among the most important of the late-Antique commentators on Aristotle are Alexander of Aphrodisias (fl. early third century), Porphyry (fl. late third century), Themistius (fl. late fourth century), Simplicius (fl. early sixth century), and John Philoponus (fl. mid-fifth century).

¹²⁸See Smith, *Ptolemy's Theory*, pp. 49-55.

¹²⁹*Oeuvres philosophiques et scientifiques d'al-Kindī*, vol. 2, ed. Roshdi Rashed and Jean Jolivet (Leiden: Brill, 1998), p. vii.

¹³⁰Among the key figures in this process of specification and elaboration are al-Kindī, al-Fārābī (c. 870-950), and Avicenna. Two later figures, al-Ghazālī (1058-1111) and Ibn Rushd, or Averroes (1126-1198), were instrumental in systematizing the model of faculties, or "internal senses," that developed from the mid-ninth century. In many ways, the wellspring of this development was the larger issue of how the soul manages to grasp the Universal—the datum of true knowledge that is absolutely unchanging and immaterial—from sense-induction, which is based on an objective world that is both material and changeable. In response to this issue, al-Kindī and his successors (probably following Alexander of Aphrodisias) articulated a distinction (actually, a set of distinctions) between the higher, active intellect (or "intellect in act")—which grasps the true Universal—and the lower potential intellect—which is the intellect in search of that Universal. The material soul, with its constituent faculties or internal senses, is the arena within which the potential intellect conducts this search. There is an immense literature dealing with this highly vexed, and equally important, subject; for a good overview of the problem and efforts at its resolution among the figures cited above, see the relevant sections on al-Kindī, al-Fārābī, and Ibn Sīnā in 'Abdurrahman Badawi, *Histoire de la Philosophie en Islam*, vol. 2 (Paris: Vrin, 1972), pp. 385-695. See also Jean Jolivet, "L'Intellect selon al-Fārābī: quelques remarques," in *Philosophie médiévale arabe et latine* (Paris: Vrin, 1995), pp. 211-219.

¹³¹Aside from the *Shifā'*, Avicenna wrote a variety of other works within which he dealt with perception, epistemology, and vision; foremost among these are the *Kitāb al-Najāt* ("Book of Deliverance"), *Maqāla f'l-Nafs* ("Compendium on the Soul"), and the *Kitāb al-Qānūn f'l-Ṭibb* ("Canon of Medicine").

¹³²For an overview of this epistemological model, its evolution, and its implications, see H. A. Wolfson's classic study, "The Internal Senses in Latin, Arabic, and Hebrew Philosophical Texts," *Harvard Theological Review* 25 (1935): 69-133. See also E. Ruth Harvey, *The Inward Wits: Psychological Theory in the Middle Ages and the Renaissance*, Warburg Institute Surveys, 6 (London: University of Lon-

don Press, 1975), A. Mark Smith, "Getting the Big Picture in Perspectivist Optics," *Isis* 72 (1981): 568-589, and A. Mark Smith, "Picturing the Mind: The Representation of Thought in the Middle Ages and Renaissance," *Philosophical Topics* 20 (1992): 149-170. For an informative terminological analysis of this model and its relationship to Alhacen, see the section entitled "The Psychological Apparatus" in Sabra, *Optics*, vol. 2, pp. 62-67.

¹³³*De placitis*, 7, 3.21, in De Lacy, p. 445; I have changed the punctuation slightly in order to make the passage syntactically clearer.

¹³⁴See, esp. Wolfson, "The Internal Senses," for a discussion of such differences.

¹³⁵For a useful account of Ḥunayn's life and works, see G. C. Anawiti's and A. Z. Iskandar's article, "Ḥunayn Ibn Ishāq" in *Dictionary of Scientific Biography*, ed. C. C. Gillispie, vol. 15, supplement 1 (New York: Charles Scribner's Sons, 1978), pp. 230-249. Along with his son, Ishāq, his nephew, Hubaysh, and a third, nonrelated collaborator, 'Isā ibn Yaḥyā, Ḥunayn in fact founded a veritable school of translators at Baghdad.

¹³⁶Edited and translated into English by Max Meyerhof, *The Book of the Ten Treatises on the Eye Ascribed to Hunain ibn Is-haq* (Cairo: 1928).

¹³⁷It bears noting that Ḥunayn specifies the perceptual and epistemological functions of the pneuma within these ventricles in much the same way as those who articulated the model of faculties discussed above. Thus, as Ḥunayn puts it, "Through the pneuma which is in the posterior cavity movement and the act of recollection are accomplished, through the pneuma which is in the anterior part of the brain observation and imagination, and through the pneuma which is in the middle part of the brain reflection;" trans. Meyerhof, *The Book of the Ten Treatises*, p. 18.

¹³⁸As is clear from Bruce Eastwood's analysis of the first three treatises, Ḥunayn departs from Galen in variety of minor ways; for more detail, see Bruce S. Eastwood, *The Elements of Vision: The Micro-Cosmology of Galenic Visual Theory according to Ḥunayn Ibn Ishāq*, Transactions of the American Philosophical Society, 72.5 (Philadelphia: American Philosophical Society, 1982).

¹³⁹Meyerhof, *The Book of the Ten Treatises*, p. 4. These protective and useful functions are much the same as those described by Galen. For instance, the vitreous humor nourishes the lens while the albuminoid humor protects it from damage by the cornea. The cornea, in turn, serves two purposes: to protect the lens by its hardness and to allow light to reach the lens through its transparency.

¹⁴⁰Meyerhof, *The Book of the Ten Treatises*, p. 4.

¹⁴¹In May, p. 503.

¹⁴²Eastwood, *The Elements of Vision*, pp. 4-5.

¹⁴³See Sabra, *Optics*, vol 2, pp. liv-lx.

¹⁴⁴Hence, when applying ray-geometry to the analysis of vision and visual appearances, Arab thinkers tended to take an extramissionist stance, and this includes such natural philosophers as al-Fārābī, who were deeply Aristotelian

in their philosophical sympathies. Avicenna, on the other hand, remained unequivocal in his commitment to intromissionism, as did later key Aristotelians, such as Averroes; see esp. David C. Lindberg, *Theories of Vision from Al-Kindi to Kepler* (Chicago: University of Chicago Press, 1976), pp. 42-57. For a recent study of the early textual transmission of Euclidean Optics in Arabic, see Elaheh Kheirandish, *The Arabic Version of Euclid's Optics* (New York: Springer Verlag, 1999).

¹⁴⁵Roshdi Rashed, "A Pioneer in Anaclastics: Ibn Sahl on Burning Mirrors and Lenses," *Isis* 81 (1990): 464-491; see also Rashed, *Géométrie et dioptrique au X^e siècle: Ibn Sahl, Al-Qūhī et Ibn al-Haytham* (Paris: Les Belles Lettres, 1993).

¹⁴⁶Roshdi Rashed, "Fūthūṭos et al-Kindī sur 'l'illusion lunaire,'" in *ΣΟΦΙΗΣ ΜΑΙΗΤΟΡΕΣ* "Chercheurs de sagesse": *Hommage à Jean Pépin* (Paris: Institut d'Études Augustiniennes, 1972).

¹⁴⁷For a Greek text and English translation of Anthemius' work, see G. L. Huxley, *Anthemius of Tralles: A Study in Later Greek Geometry* (Cambridge, MA: Harvard University Press, 1959). In the *Fihrist*, Ibn al-Nadīm tells us of a certain 'Utāriḍ ibn Muḥammad, who claims to have used Anthemius' work as the basis for his own; see Sabra, *Optics*, vol. 2, p. xlv. For "Dtrums," see Rashed, "A Pioneer in Anaclastics," p. 468.

¹⁴⁸See Sabra, *Optics*, vol. 2, p. xlv.

¹⁴⁹These two treatises were translated into Latin by Gerard of Cremona. For critical Latin texts, with German translations and commentary, see Axel Björmbom and Sebastian Vogel, ed. and trans., *Alkindi, Tideus und Pseudo-Euklid: Drei optische Werke* (Leipzig: Teubner, 1912).

¹⁵⁰For a recent study of al-Kindī's optical thought and its philosophical foundations, see Pinella Travaglia, *Magic, Causality and Intentionality. The Doctrine of Rays in Al-Kindī*, Micrologus Library, vol. 3. (Florence: Edizioni del Galluzzo, 1999).

¹⁵¹As we have seen on pp. xxix-xxx above, Ptolemy also insisted that visual radiation is absolutely continuous and, on that basis, reduced the ray to a virtual entity. However, since it seems unlikely that al-Kindī availed himself of Ptolemy's *Optics*, the two thinkers must have arrived at this conclusion independently.

¹⁵²According to Sabra, *Optics*, vol. 2, pp. 25-26, Aḥmad ibn 'Īsā, who preceded al-Kindī, took essentially the same approach to the problem, accepting "the hypothesis of continuous visual radiation (against Euclid) and [having] the idea that perception of a given point in the visual field was in general effected through *all* points on an area of the surface of the eye which we may designate as the visually effective area."

¹⁵³That Ibn al-Haytham was familiar with at least some of these sources—e.g., Aḥmad ibn 'Īsā and Ibn Sahl—is likely, but whether or how such sources might have had a formative influence on his work is by no means certain.

¹⁵⁴In the dedicatory preface to his *Perspectiva*, Witelo refers to the "tedium of Arabic verbosity" (*tedium verbositatis arabice*), which is presumably directed at

Alhacen; see Risner, *Opticae thesaurus*, p. 1.

¹⁵⁵For this list, see III, 3.1-3, p. 588 below. Ibn al-Haytham discusses these preconditions much earlier, in book 1, chapter 2 of the Arabic text, but this is one of the three chapters missing in the Latin version (see p. xxiii above).

¹⁵⁶On the distinction between *lux* (essential light) and *lumen* (accidental light), see I, 4.1, note 2 to book 1, p. 395 below. Alhacen's most extensive discussion of light and transparency occurs in book 1, chapter 3 of the Arabic version (see Sabra, *Optics*, vol. 1, pp. 13-51). Although this chapter is missing from the Latin version, there are clues scattered throughout it (see esp. I, 6.1-4, p. 356 below) that make it easy to reconstruct his theory of light-radiation and transparency.

¹⁵⁷Note the similarity between Alhacen's model of indifferent radiation from every point on a luminous surface and al-Kindī's model of indifferent radiation from every point on the corneal surface; see pp. l-lii above.

¹⁵⁸On the punctiform radiation of light from luminous surfaces, see I, 6.1, p. 355 below; on the sphere of propagation, see I, 3.9-19, in Sabra, *Optics*, vol. 1, pp. 15-20; on the virtual status of the mathematical ray, see IV, 3, prop. 16, in Risner, *Opticae thesaurus*, p. 112 (*Omnia linea per quam movetur lux a corpore luminoso ad coprus opposito est linea sensualis, non sine latitudine . . . Observatur ergo in omni luce ratio linearum et punctorum intellectuum, licet ab eis aut per ipsas non procedat lux*).

¹⁵⁹On opacity *per se*, see I, 6.50, p. 371 below; on the distinction between reflective and nonreflective opaque bodies, see IV, 3, prop. 6, in Risner, *Opticae thesaurus*, p. 104; on the relative nature of opacity, see I, 8.10, p. 394 below; on illuminated bodies as light-sources in their own right, see I, 3.88, in Sabra, *Optics*, vol. 1, p. 38; see *ibid.* on secondary (or accidental) vs primary light (see also I, 6.99-104, pp. 382-384 below).

¹⁶⁰Actually, Alhacen never makes it clear whether, on its own, color even has the power to replicate itself through transparent media.

¹⁶¹On the natural concurrence of opacity and color, see I, 8.9-10, pp. 393-394 below; on the nonilluminative nature of color *per se* and the need for light to render it visible, see I, 8.6, p. 392 below; on the natural commingling of color and light, see I, 6.2-3, p. 356 below.

¹⁶²On transparency as the natural capacity to transmit light, see I, 6.4 and 6.50, pp. 356 and 371 below; on the inherent opacity or *spissitudo* of such exquisitely transparent bodies as air, see I, 3.44, in Sabra, *Optics*, p. 29; on the tinging of light by air, see I, 3.45-46, in Sabra, *Optics*, p. 29.

¹⁶³On refractivity in general, see I, 6.18, p. 360 below; for an extensive discussion of the physical cause of refractivity, see also A. Mark Smith, "Extremal Principles in Ancient and Medieval Optics," *Physis* 31 (1994): 113-140, and *Descartes's Theory of Light and Refraction: A Discourse on Method*, Transactions of the American Philosophical Society 77, 3 (Philadelphia: American Philosophical Society, 1987), pp. 32-56.

¹⁶⁴For the dynamic properties of rays and the likening to trajectories, see I, 6.24 and 6.43, pp. 363 and 369 below; see also Smith, "Extremal Principles" and

Descartes's Theory.

¹⁶⁵On the basic function of the eye to be affected by light and color, see I, 6.1, pp. 355-356 below; on afterimage, see I, 4.3-4.7, p. 343 below; on the difficulty in seeing strong colors in weak light, see I, 4.20, p. 346 below; on the failure to see strongly colored transparency in weak light, see I, 4.22, p. 347 below; on the firefly, see I, 4.16, p. 346 below.

¹⁶⁶See pp. lxxxiv-xc above.

¹⁶⁷For the relevant discussions of Aristotle, Ptolemy, Galen, and al-Kindī, see pp. xxvi-xxvii, xxix-xliv, and l-lii above.

¹⁶⁸For Alhacen's actual argument, see I, 6.58-59, pp. 373-374 below.

¹⁶⁹On the hollow optic nerves, see I, 5.2, p. 348 below; on the scleral and uveal tunics, see I, 5.5-6, p. 348 below; on the corneal continuation of the sclera, see I, 5.8 and 5.18, pp. 348 and 350 below; on the pupil, see I, 5.7, p. 348 below.

¹⁷⁰On the glacial sphere and its two humors, glacial and vitreous, see I, 5.9-10, p. 349 below; on the albugineous humor, see I, 5.12, p. 349 below; on the aranea, see I, 5.10 and 7.5, pp. 349 and 388 below.

¹⁷¹On the passage of visual spirit from the brain through the hollow optic nerves, see I, 5.14, pp. 349-350 below; on the role of visual spirit in sensitizing the lens, see I, 7.7, p. 388 below; for Galen's and Ḥunayn's discussions of *pneuma psychikon* and the essential sensitivity of the lens see pp. xxxix-xl and xlviii above; note also al-Kindī's model of visual radiation from the corneal surface, see pp. l-li above.

¹⁷²On the muscular attachments of the eyeball, see I, 5.38, p. 355 below; on the flexing of the optic nerve at the back of the eyeball, see I, 5.17, p. 350 below.

¹⁷³On the sphericity of the eyeball, see I, 7.15, pp. 389-390 below; on the placement of the glacial sphere and its centerpoint toward the front of the eyeball, see I, 5.9 and 5.10, p. 349 below; on the flattening of the anterior surface of the *glacialis*, see I, 5.10, p. 349 below; on the concentricity of that surface with the corneal surface, see I, 5.29, p. 353 below.

¹⁷⁴On the axial line, see I, 5.23-28, pp. 351-353 below; on the meeting of all orthogonals at the eye's centerpoint, see I, 6.25-26, p. 363 below.

¹⁷⁵Since Ḥunayn has the lens at the very center of the eye, he does not need to have the cornea bulge outward in order to leave some space between its inner surface and the anterior surface of the lens. On the other hand, Ḥunayn does not explicitly rule out the possibility of that bulge as Alhacen does; for Ḥunayn's description of the cornea and its relation to the scleral tunic, see *The Book of the Ten Treatises*, pp. 4 and 9.

¹⁷⁶Cf. pp. xlviii-xlix above.

¹⁷⁷Alhacen sets up this problem in I, 6.12-13, p. 358 below.

¹⁷⁸On the sensitive and refractive selection of orthogonal impressions, see I, 6.14-24, pp. 358-363 below; on the resulting cone of radiation with vertex at the centerpoint of eye, see I, 6.25-28, pp. 363-364 below; on the resulting point-by-point representation on the lens' surface, see I, 6.29-30, pp. 364-365 below; on reasons why no other model will work, see I, 6.31-42, pp. 365-369 below.

¹⁷⁹On the problem of image-reversal, see II, 2.6, p. 419 below.

¹⁸⁰On the necessity that the interface between glacial and vitreous humors lie ahead of the eye's centerpoint, see II, 2.9, p. 420 below; see *ibid.* on the necessity that this interface be less sharply curved than the anterior surface of the lens; on the differing refractivity of glacial and vitreous humors, see II, 2.14, pp. 421-422 below; on visual spirit as the transmittive medium in the optic nerves, see II, 2.17-18, p. 423 below; on the passage of forms to the optic chiasma and their presentation to the final sensor there, see II, 2.23-24, pp. 426-427 below; on the fusion of binocularly perceived forms at the optic chiasma, see III, 2.17, pp. 569-570 below. For Galen's earlier claim that image-fusion occurs at the optic chiasma, see pp. xlii-xliii above.

¹⁸¹On the pain of the initial visual impression at the lens and its normal imperceptibility, see I, 6.67, p. 376 below; on the neurological transmission of this pain to the final sensor, see II, 2.14, pp. 421-422 below; on the double receptivity (refractive and sensitive) of the optic complex, see II, 2.11-16, pp. 421-423 below.

¹⁸²On the nonjudgmental nature of brute sensation, see II, 3.54-56, pp. 443-444 below; for the list of twenty-two visible intentions, see II, 3.44, pp. 438-439 below.

¹⁸³On the faculty of discrimination and its function of differentiating among visible intentions, see II, 3.17, p. 431 below.

¹⁸⁴On the syllogistic nature of discrimination, see II, 3.26-31, pp. 433-434 below; on the process of comparison, or correlation, see II, 4.17, pp. 518-519 below; on the deduction of transparency, see II, 3.13 and 3.195, pp. 430-431 and 502-503 below; on the deduction of corporeity, see II, 3.122, p. 470 below.

¹⁸⁵On the innate capacity to discriminate and deduce, see II, 3.38-39, pp. 436-437 below; on learning through repetition, see II, 3.42, pp. 437-438 below; on the imagination as storehouse of learned and remembered forms, see II, 4.12, pp. 516-517 below.

¹⁸⁶On the distinction between remoteness *per se* and remoteness as distance, see II, 3.68, p. 448 below.

¹⁸⁷II, 3.73, p. 450 below.

¹⁸⁸See II, 3.71, p. 449 below.

¹⁸⁹On determining distance according to bodily measure, see II, 3.151-156, pp. 481-485 below; on the recognition of distances through repetition and recognition, see II, 3.154, pp. 483-484 below; on our tendency to reach such perceptual determinations unconsciously, without being aware of the process through which we reach them, see II, 3.36-41, pp. 435-437 below; on the need for a continuous ordered range of bodies for determining long distance, see II, 3.78-80, pp. 452-453 below; on successive portions of ground serving as such a range, see II, 3.150, p. 481 below; on the fundamental accuracy of resulting determinations, see II, 3.87-89, pp. 455-456 below; on the inaccuracy of mere estimation for vast distances over which there are no definite landmarks, see II, 3.91, p. 456 below.

¹⁹⁰For Alhacen's overall account of size-perception, see II, 3.134-146, pp. 474-479 below; on imagining the visual angle, see II, 3.144, p. 478 below; on the threefold correlation among the relative extent of the portion of the visual field occupied by the object, the size of the imagined visual angle subtended by that portion, and distance, see II, 3.146, p. 479 below.

¹⁹¹On size-perception through repetition and recognition, see II, 3.149, pp. 480-481 below; for the example of viewing our hand against a wall, see II, 3.147, p. 479 below; see also II, 3.136-137, p. 475 below for a clear articulation of the size-distance invariance principle.

¹⁹²Cf. Ptolemy's account of distance- and size-perception on pp. xxxii-xxxiii above; note his inclusion of the object's slant in the determination of size; Alhacen, too, refers to slant, e.g., in II, 3.138-139, pp. 475-476 below.

¹⁹³In "The History of the Theory of Human Proportions as a Reflection of the History of Styles," in *Meaning in the Visual Arts* (Garden City, N.Y.: Doubleday, 1955), Erwin Panofsky claims, to the contrary, that "Alhacen's aesthetics is remarkable, . . . above all, for its pervasive relativism" (p. 90n). Suffice to say, I find this assessment at best misleading, at worst misconceived.

¹⁹⁴On the inherent beauty of lunar light, rose-red, and smoothness, see II, 3.202, 3.203, and 3.215, pp. 504-506 below; on the relational nature of characteristics that confer beauty, see II, 3.222-223, pp. 507-508 below; on the moon's being more beautiful than a star by virtue of size, see II, 3.208, p. 505 below; on the proportionate nature of eye-shape and size, see II, 3.224, p. 508 below; on the ugliness of blue eyes and blond hair, see III, 7.124 in Sabra, *Optics*, vol. 1, pp. 322-323.

¹⁹⁵II, 3.230, p. 509 below.

¹⁹⁶II, 3.227, *idem.*.

¹⁹⁷*Idem.*

¹⁹⁸Despite his emphasis on relation and proportionality as the overarching principle in beauty, Alhacen reveals certain "absolutist" tendencies in his assessment of beauty. Two instances are his claims in I, 7.9 and 7.14, pp. 388-389 below, that the whiteness of the sclera and the doubling of the eyes were specifically designed by the Creator (*operator*) to make the face comely.

¹⁹⁹For some elaboration on this point, see Sabra, *Optics*, vol. 2, pp. 99-100.

²⁰⁰My mistress' eyes are nothing like the sun;/Coral is far more red than her lips' red;/If snow be white, why then her breasts are dun;/If hairs be wires, black wires grow on her head./I have seen roses damask'd, red and white,/But no such roses see I in her cheeks;/ And in some perfumes is there more delight/Than in the breath that from my mistress reeks./I love to hear her speak, yet well I know/That music hath a far more pleasing sound;/I grant I never saw a goddess go;/My mistress, when she walks, treads on the ground:/And yet, by heaven, I think my love as rare/As any she belied with false compare.

²⁰¹Thus, as Alhacen puts it in II, 3.197, p. 503 below, "Opacity is perceived by sight through the absence of transparency. So when sight perceives a body but senses no transparency in it, it will deduce its opacity."

²⁰²See II, 3.178-186, pp. 496-499 below.

²⁰³See II, 4.1, p. 512 below, on the impossibility of any visible intention's existing alone and on the consequent fact that objects are perceived as a totality of their visible attributes, each of which is perceived in isolation only through analysis; see II, 4.2-4, pp. 512-513 below on the need of close visual scrutiny (*intuitio*) for certification.

²⁰⁴On the increasing weakness of lateral vision within the visual cone, see II, 2.24-25, pp. 427-428 below; on the concerted effort of both eyes to focus the visual axes on a single point, see III, 2.3, p. 563 below. Alhacen explains the weakness of lateral vision on the basis of the refraction of visible spot-forms at the interface between glacial into the vitreous humors: the farther removed those spot-forms are from the axis, the more they are refracted and, consequently, the more they are weakened; see II, 2.25, pp. 427-428 below.

²⁰⁵In the case of monocular vision, according to Alhacen's account in II, 3.102, p. 461 below, "a surface [is said] to face the eye directly when it is perceived by sight straight ahead and when the visual axis touches some point on it so as to form equal [i.e., right] angles with it": moreover, he goes on to say in II, 3.106, pp. 462-463 below, "when the point on the surface or line to which the [visual] axis will be perpendicular is the midpoint of that surface or line, the surface or line will be [in a] perfectly facing [disposition] vis-à-vis the eye (*in fine directe oppositionis visui*)." In binocular vision, then, an object will have a perfectly facing disposition when the two axes come to focus on the midpoint of the object's surface and, in so doing, form equal angles with that surface; see III, 2.2, p. 563 below.

²⁰⁶See III, 2.12, p. 567 below.

²⁰⁷Note the virtual equivalence between Alhacen's and Ptolemy's conception of the common axis; see pp. xxxiii-xxxiv above.

²⁰⁸On the increasing indefiniteness of vision as the object viewed gets farther from the common axis, see III, 19-20, pp. 570-572 below.

²⁰⁹On the visual scan of cross-sections, see II, 4.8, p. 514 below; on the double impression of part and whole, see II, 4.10, pp. 515-516 below; on committing the resulting form to memory, see II, 4.12, pp. 516-517 below; on making that form more definite and planting it more firmly in memory through rehearsal, see II, 4.13-14, p. 517 below; on memorizing a speech as an analogue, see II, 4.15, pp. 517-518 below.

²¹⁰On assimilation as finding identical notional form, see II, 3.21, p. 432 below.

²¹¹On memorizing unfamiliar attributes or objects, see II, 4.18, pp. 519-520 below; on trying to fit an unfamiliar form into a given niche by assimilating it to notional entities already ensconced in the imagination, see 4.19, pp. 520-521 below.

²¹²On the relative generality and simplicity of the universal form according to the limited set of its defining characteristics, see II, 4.16, p. 518 below; on the individual form as a complex of many specific defining characteristics, see II,

4.23, p. 523 below; on remembering individuals according to ambient circumstances, see II, 4.12, pp. 516-517 below.

²¹³On recognition by “signs” or defining features as a shorthand way of perceiving things, see II, 4.20-22, pp. 521-523 below.

²¹⁴On vision at first glance, with or without recognition, see II, 4.33, p. 528 below; on the indeterminacy or inaccuracy of such vision, even with recognition, see II, 4.32, pp. 527-528 below; on close visual scrutiny with or without recognition, see II, 4.34, pp. 528-529 below.

²¹⁵On the fact that all perception takes time, see II, 3.57, p. 444 below; on the fact that perception with recognition takes less time than perception without recognition, see II, 4.20 and 4.34, pp. 521 and 528-529 below; on the fact that the universal form is perceived before the individual form, see II, 4.23, p. 523 below; on the difficulty of distinguishing between almost identical objects, see II, 4.25, pp. 524-525 below.

²¹⁶There is, however, a fundamental difference between Alhacen’s universal form and Aristotle’s universal in that the former is a compendium of physical attributes alone, whereas the latter somehow indicates essence. Accordingly, the universal form of “human” for Alhacen might simply represent “featherless biped,” while Aristotle’s universal would somehow represent “mortal, rational animal.”

²¹⁷See pp. xlv-xlvii above.

²¹⁸Throughout book 2 of the *De aspectibus*, Alhacen refers various perceptual functions—particularly mnemonic functions—to the soul. Since these functions follow the process of discrimination carried out by the final sensor, and since Alhacen explicitly locates the final sensor in the brain (see note below), it follows that the soul resides in the brain. That being the case, Alhacen seems to conceive of the soul according to its embodiment in the brain, much as al-Kindī, al-Fārābī, and their like conceived of it; see p. xlvii above.

²¹⁹On the location of the final sensor at the front of the brain, see I, 6.68, p. 376 below; on the visible form’s presentation to the final sensor at the optic chiasma, see II, 2.4, p. 418 below.

²²⁰Alhacen’s notion of the “impression” or “etching” (*figere*) of forms in the imagination is reminiscent of Aristotle’s seal-and-wax analogy; see p. xxvii above..

²²¹See, e.g., II. 3.25-40, pp. 433-437 below. That Aristotle conceived of seeing as a sort of knowing, and vice-versa, is clear from his insistence that we think through images; for an account of Aristotle’s sense-based epistemology that is slanted toward vision, see Smith, “Picturing the Mind.”

²²²See IV, 1, prop. 1 in Risner, *Opticae thesaurus*, p. 102.

²²³For Alhacen’s discussion of the normative range of these preconditions, see III, 3.6, p. 589 below.

²²⁴For Alhacen’s full supporting discussion of this account of locational correspondence and formal overlap at the optic chiasma, see III, 2.7-8 and III, 2.13-18, pp. 565-566 and 567-568 below.

²²⁵On the relative indeterminacy of vision at a slant, see III, 2.66 and 2.80-85, pp. 583 and 586-588 below; for Alhacen's explanation of that indeterminacy, see III, 2.80, p. 586 below.

²²⁶On the various ways in which the overall continuity of the visual impression is emphasized over its specific discontinuities, see III, 2.7 and 2.19-21, pp. 565-566 and 570-572 below.

²²⁷On image-doubling when the object is placed in front of or behind the intersection of the visual axes, see III, 2.22, pp. 572-573 below; on image-doubling when the object is placed on only one visual axis, see III, 2.23, p. 573 below; although Alhacen does not explicitly state that image-doubling becomes more pronounced with the acuteness of displacement, it is implicit in the experiment he describes in III, 2.34-43, pp. 575-576 below; cf. Ptolemy's analysis of the relationship between displacement and image-doubling on pp. xxxiv-xxxv above

²²⁸For Alhacen's description of the plaque, see III, 2.26-27, p. 573 below; the series of experiments, along with summaries of their results, is described over the remainder of chapter 2 of the third book.

²²⁹On the proportionate nature of the normative range according to all eight preconditions, see III, 3.15-33, pp. 592-593 below.

²³⁰On illusions arising from brute sensation, see III, 5.1-15, pp. 595-596 below. These misperceptions are limited to light and color alone, since they constitute the sole proper object of brute sensation

²³¹On illusions arising from misrecognition, see III, 6.1-31, pp. 597-600 below. These misperceptions are specific to universal or individual forms, since those are recognized according to notional representations in the imagination.

²³²On illusions arising from improper deduction, see III, 7.1-60, pp. 600-609 below. This is by far the longest section of his overall analysis of illusions because deduction is specific to individual visible intentions. Accordingly, for each of the eight skewed preconditions, the effect of that skew must be illustrated for each of the twenty-two visible intentions.

²³³Note, however, that Alhacen's categorization of illusions is based on the relative "immediacy" or simplicity of the perception, brute sensation being simplest and most immediate, recognition being less immediate but still relatively simple because of its basis in signs and comprehensive notional forms, and deduction or discrimination being least immediate because of its basis in close visual scrutiny.

²³⁴See, e.g., Sabra's discussion in *Optics*, vol. 2, pp. 106-111.

²³⁵All of the remarks in this concluding section apply to the original Arabic version, not just its Latin counterpart—hence the continuing reference to "Ibn al-Haytham" rather than "Alhacen."

²³⁶Hunayn, of course, is of the Arabic intermediaries upon whom Alhacen may have drawn. What others, if any, Alhacen consulted is an open question. Hunayn himself mentions several factions in his own day who were split over the number of tunics composing the eye (from seven down to two), but he gives no names; see *The Book of the Ten Treatises*, pp. 10-11. It does seem likely

that Alhacen was arguing from authority rather than from direct experience in his account of the eye; see I, 5.2, 5.14, 5.39, and 6.14, pp. 348, 349-350, 355, and 358-359 below.

²³⁷See A. Mark Smith, "Alhazen's Debt to Ptolemy's *Optics*," in T. H. Levere and W. R. Shea, eds., *Nature, Experiment, and the Sciences* (Dordrecht: Kluwer, 1990), pp. 147-164.

²³⁸That the vertex of the cone still serves as the ultimate reference-point for distance-perception in Alhacen's theory is evident in his explanation for why objects seen from too close appear larger than they should; see III, 7.25, pp. 605-606 below.

²³⁹For a broad survey of this translation-movement and a representative sample of the texts involved, see David C. Lindberg, "The Transmission of Greek and Arabic Learning," in David C. Lindberg, ed., *Science in the Middle Ages* (Chicago: Chicago University Press, 1978), pp. 52-90.

²⁴⁰Aristotle's *De sensu* was first translated from Greek into Latin by an as-yet-unknown translator. Euclid's *Optics* appeared in three different versions during the twelfth century, one of them from the Greek (version 1), the other two from Arabic. Gerard of Cremona is probably responsible for one of the versions (version 2) drawn from the Arabic. Euclid's *Catoptrics* was probably translated from the Arabic by the same person who produced version 3 of the *Optics*. Ptolemy's *Optics* was rendered into Latin by the Emir Eugene of Sicily. The earlier translation of Aristotle's *De anima* (from the Arabic) was translated by James of Venice. For details on these translations, see Sarton, *Introduction*, vol. 2.1, p. 340; Wilfred Theisen, "The Mediaeval Tradition of Euclid's *Optics* (PhD dissertation, Madison: University of Wisconsin, 1974); Ken'ichi Takahashi, *The Medieval Latin Traditions of Euclid's Catoptrica* (Fukuoku: Kyushu University Press, 1992); and Smith, *Ptolemy's Theory*.

²⁴¹Al-Kindī's *De intellectu* was translated into Latin by John of Seville (or perhaps Gerard of Cremona), his *De aspectibus* by Gerard of Cremona, and his *De radiis* by an as-yet-unknown translator. Al-Fārābī's *De ortu scientiarum* first appeared in Latin at the hand of John of Seville, although it was later rendered into Latin by Gerard of Cremona. Ḥunayn ibn Ishāq's *De intellectu et intellecto* was translated by Gerard of Cremona, his *Ten Treatises* about a century earlier by Constantine the African. Gerard of Cremona was also responsible for Latin versions of Razes' *Liber ad Almansorem* and Avicenna's *Canon*. The portion of Avicenna's *Al-Shifā'* the soul was perhaps translated by Domenicus Gundissalinus, although it cannot be definitively ascribed to him. Al-Ghazālī's *De ortu scientiarum* was translated by both John of Seville and Gerard of Cremona. The earlier translation of Aristotle's *De anima* (from the Greek) was made by James of Venice (fl. c. 1145). For discussions of these translations, see Sarton, *Introduction*, vol. 2.1, pp. 171-172, 325, 340, and 342, and vol. 2.2, pp. 579-580; Simone Van Riet, *Avicenna Latinus: Liber de anima seu sextus de naturalibus*, I-II-III (Leiden: E. J. Brill, 1972), pp. 91*-105*; M-Th. d'Alverny and F. Hudry, "Al-Kindī, De radiis," *Archives d'histoire doctrinale et littéraire du moyen âge* 41 (1974): 139-260.

²⁴²Grosseteste wrote several works dealing with light and its various manifestations, but the *De luce* ("On Light") stands as the best example of his commitment to light-metaphysics; for an English translation of this work, see Clare C. Riedl, *Robert Grosseteste on Light* (Milwaukee, 1942). As "Christianized" by Augustine, the tradition of light metaphysics is based upon the idea that we cannot achieve true knowledge without the aid of Christ's divine light. The sources for the development of this tradition to the time of Grosseteste are manifold, including not only pagan Greek and Christian sources, but also such Arabic sources as al-Kindī's *De radiis* and the *Fons vitae* of Avicbron (Ibn Gabirol). For a brief account of the development of this tradition and its implications for optics, see Lindberg, *Roger Bacon's Philosophy*, pp. xxxv-liii. See also Lindberg, "The Genesis of Kepler's Theory of Light: Light Metaphysics from Plotinus to Kepler," *Osiris* 2 (1986): 5-42.

²⁴³See Lindberg, *Roger Bacon's Philosophy*, pp. xxxiii-xxxv. Aside from Alhacen's *De aspectibus*, a sampling of Lindberg's sampling includes Seneca, Cicero, Pliny, Boethius, Aristotle (nine treatises), Avicenna (six treatises), Averroes (six treatises), Ptolemy's *Optics*, the Pseudo-Aristotelian *Liber de causis*, Thābit ibn Qurra, al-Battānī, al-Kindī, and al-Fārābī.

²⁴⁴For what has become the canonical account of this development, see Lindberg, *Theories of Vision*. Since Lindberg has provided most of the important narrative details there, I will not repeat them at length in the discussion that follows.

²⁴⁵For details, see Lindberg, *Roger Bacon and the Origins*, pp. cii-cv.

²⁴⁶For details, see Lindberg, *Roger Bacon's Philosophy of Nature*, pp. lxxv-lxxviii.

²⁴⁷For details, see Unguru, *Witelonis Perspectivae Liber Secundus et Liber Tertius*, pp. 32-36, and Smith, *Witelonis Perspectivae Liber Quintus*, p. 72-76.

²⁴⁸For details, see David C. Lindberg, *A Catalogue of Medieval and Renaissance Optical Manuscripts* (Toronto: Pontifical Institute of Mediaeval Studies, 1975), pp. 68-71. See also Lindberg, *Roger Bacon and the Origins*, p. xcvi.

²⁴⁹See Lindberg, *Catalogue*, p. 71. For a more detailed description, see Lindberg, *John Peckham and the Science of Optics*, pp. 52-57.

²⁵⁰See Smith, *Witelonis*, p. 76.

²⁵¹See Lindberg, *Roger Bacon and the Origins*, p. cv, and *Roger Bacon's Philosophy of Nature*, p. lxxviii.

²⁵²See Lindberg, *Roger Bacon and the Origins*, p. xcvi. That Perspectivist optics was commonly studied in late-fourteenth-century England is suggested by Chaucer's mention of Alhacen and Witelo in a brief passage on "perspective" in the *Canterbury Tales* (lines 225-234 of the "Squire's Tale"): And somme of hem wondred on the mirour,/That born was up into the maister-tour,/Hou men myghte in it swiche thynges se./Another answerde, and seyde it myghte wel be/Naturelly, by composiciouns /Of anglis and of slye reflexiouns, /And seyde that in rome was swich oon. /They speken of alocen and vitulon,/And aristotle, that writen in hir lyves /Of queynte mirours and of perspectives.

²⁵³See Lindberg, *Catalogue*, pp. 22-36.

²⁵⁴See pp. cvi and cxi above for further discussion on these two figures.

²⁵⁵For a brief discussion of Maurolyco, see pp. xci-xcii above. For a more extensive discussion of both Maurolyco and Porta as optical thinkers, see David C. Lindberg, "Optics in Sixteenth-Century Italy," in *Novità celesti e crisi del sapere*, supplement to *Annali dell'Istituto e Museo di Storia della Scienza* fasc. 2 (1983): 131-148.

²⁵⁶For Lindberg's account of Kepler, see *Theories of Vision*, pp. 185-208.

²⁵⁷*Theories of Vision*, p. 208. See also Lindberg "Continuity and discontinuity in the history of optics: Kepler and the medieval tradition," *History and Technology* 4 (1987): 431-448.

²⁵⁸Cf., however, my discussion on pp. c-ci above.

²⁵⁹Perhaps the most obvious problem with Descartes's demonstration is that it depends upon the supposition that light travels faster in optically denser media than it does in optically rarer one. This assumption flies in the face of Descartes's earlier assertion that light is transmitted instantaneously.

²⁶⁰For this argument and its justification, see Smith, *Descartes's Theory of Refraction*. For the primary counter-argument, which has been repeated at several reprises—most recently in Stephen Gaukroger, *Descartes: an intellectual biography* (Oxford: Clarendon Press, 1995)—see Gaston Milhaud, *Descartes savant* (Paris: Librairie Félix Alcan, 1921).

²⁶¹See, e.g., *Perspectiva* III.3,1-4, in Lindberg, *Roger Bacon and the Origins*, pp. 321-335. Bacon also stresses the practical utility of optics, a proper knowledge of which will allow us to extend and improve physical vision through reflection and refraction. In fact, eyeglasses first appeared within some thirty years of the writing of the *Perspectiva*, and they were in common use by the later Renaissance. During the Renaissance, as well, concave spherical mirrors were used as reading glasses for close work in reading, writing, and illumination.

²⁶²As Lindberg points out in *Roger Bacon's Philosophy*, p. liv, al-Kindī's *De radiis stellarum*, a treatise on the radiation of astrological influences, was instrumental to Bacon's conception of power and its radiation.

²⁶³On the relationship between passive and active power, see *De multiplicatione specierum*, I, 3, in Lindberg, *Roger Bacon's Philosophy*, pp. 44-49. See d'Alverny and Hudry, "Al-Kindī, De radiis" for a detailed discussion of the *De radiis* and its dissemination in the Latin West.

²⁶⁴For the distinction between *lux* and *lumen*, see *De multiplicatione specierum*, I, 1, in Lindberg, *Roger Bacon's Philosophy*, pp. 2-5. For Bacon's description of species-multiplication, see *De multiplicatione specierum*, II, 1, in Lindberg, *Roger Bacon's Philosophy*, pp. 90-95. For a good analysis of Bacon's doctrine of species-multiplications, see Lindberg, *Roger Bacon's Philosophy*, pp. liv-lxiii; see also Smith, "Getting the Big Picture," pp. 578-580. Bacon's conception of multiplication as a spot-by-spot passage through the medium led him to propose that light-radiation takes time rather than occurring instantaneously—a proposal that set him apart from all of his later Perspectivist confreres; see David C. Lindberg, "Medieval Latin Theories of the Speed of Light," in René Taton, ed.,

Roemer et la vitesse de la lumière (Paris: Vrin, 1978).

²⁶⁵See *Perspectiva*, I, 2.2-I, 6.1, in Lindberg, *Roger Bacon and the Origins*, pp. 2-74. Bacon disagrees with Alhacen over the location of the final sensor, placing it at the optic chiasma itself rather than in the forepart of the brain.

²⁶⁶For Bacon's discussion of the three levels of visual perception, see *Perspectiva*, I, 10.3 and II, 3.1-9, in Lindberg, *Roger Bacon and the Origins*, pp. 154-159 and 194-251. In *Perspectiva*, I, 10.3, Bacon describes the universal form as a sort of "diffuse particular" (*particulare vagum*), which "is as common as its universal and is convertible with it" (p. 157).

²⁶⁷Bacon's almost-boundless admiration for Avicenna is summed up in his remark in *Perspectiva*, I, 1.3 that "Avicenna was the perfect imitator and expositor of Aristotle and the commander and prince of philosophy after him" (Lindberg, *Roger Bacon and the Origins*, p. 17).

²⁶⁸For Bacon's discussion of the perceptual faculties and their locations in the brain, see *Perspectiva*, I, 1.2-5, in Lindberg, *Roger Bacon and the Origins*, pp. 4-21.

²⁶⁹*Ibid.*, p. 9.

²⁷⁰See *Perspectiva*, I, 1.4, in Lindberg, *Roger Bacon's Philosophy*, pp. 12-17. The example of a sheep perceiving the wolf's malignant intentions is drawn from Avicenna, who uses it to show how we can perceive things that are *per se* imperceptible; see *Liber de anima*, I, 5, in Van Riet, *Avicenna Latinus, I-II-III*, p. 86.

²⁷¹See pp. lxi-lxiv and lxxiii-lxxii above.

²⁷²For an account of how Ibn al-Haytham (but not necessarily Alhacen) might have understood "form" (= *ṣūra* in Arabic), see A. I. Sabra, "Form in Ibn al-Haytham's Theory of Vision"; see also Sabra's account in *Optics*, vol. 2, pp. 68-70.

²⁷³See *De multiplicatione specierum* I, 1, in Lindberg, *Roger Bacon's Philosophy*, p. 5.

²⁷⁴*Ibid.*, p. 43.

²⁷⁵To underline this point, Bacon insists that, contrary to the claims of some philosophers, species are not spiritual; they must have material or corporeal existence; see, e.g., *Perspectiva*, I, 6.4, in Lindberg, *Roger Bacon and the Origins*, pp. 86-89.

²⁷⁶See *De multiplicatione specierum*, I, 3, in Lindberg, *Roger Bacon's Philosophy*, pp. 47-49.

²⁷⁷For a useful discussion of the meaning of "intention" (= *ma'nā* in Arabic) as used by various Arabic thinkers, including Avicenna, see Sabra, *Optics*, vol. 2, pp. 70-73.

²⁷⁸It should be pointed out that, in its intentional state, the species is not an object of perception. Only when it is realized in the appropriate faculty does it manifest its intentions in such a way that what is actually perceived is the object that it intends. In a sense, then, the faculty actually "becomes" the object intended by the species. Hence, when I perceive Martin, I perceive Martin himself, not his depiction in the species, so the species *per se* does not intervene

between me, as perceiver, and the object as perceived.

²⁷⁹On the problem of correspondence, see Smith, "Getting the Big Picture" and "Picturing the Mind."

²⁸⁰The sophistication of Alhacen's treatment of reflection is evident in his solution of what came to be called "Alhazen's Problem," which was posed thus by Christiaan Huygens in 1669: "Given a spherical convex or concave mirror, and given a centerpoint of sight and a point on a visible object, to find the point of reflection on the mirror's surface." Isaac Barrow, an exceptional mathematician for his day, also dealt with this problem in his *Lectiones opticae* of 1669. Both Huygens and Barrow solved the problem algebraically, whereas Alhacen's solution is strictly geometrical and depends in part upon the properties of hyperbolic sections—a fact that led Barrow to complain about its untoward length and tediousness. For an analysis of Alhacen's approach to the problem, see A. I. Sabra, "Ibn al-Haytham's Lemmas for Solving 'Alhazen's Problem,'" *Archives for History of Exact Sciences* 26 (1982): 299-324.

²⁸¹For a brief discussion of Grosseteste, see Lindberg, *Roger Bacon and the Origins*, pp. xxxvii-xl. Albertus Magnus (c. 1200-1280) also drew upon Euclid's *Optics* and al-Kindi's *De aspectibus* for his knowledge of mathematical optics, although, unlike Grosseteste, he also drew upon Alhacen's *De aspectibus*. However, while Grosseteste was led by his sources to favor the extramissionist theory of sight, Albertus opposed that theory because of his deep Aristotelian sympathies; see Cemil Akdogan, *Albert's Refutation of the Extramission Theory of Vision and His Defence of the Intramission Theory* (Kuala Lumpur: International Institute of Islamic Thought and Civilization, 1998).

²⁸²Just how unsophisticated Grosseteste's ray-analysis was is evident from his half-angle rule of refraction. According to that rule, the angle of refraction is half the angle of incidence; for details, see Bruce S. Eastwood, "Grosseteste's 'Quantitative' Law of Refraction: A Chapter in the History of Non-Experimental Science," *Journal of the History of Ideas* 28 (1967): 403-414. That Grosseteste probably never read Ptolemy's *Optics* goes a long way toward explaining his relative ineptitude at ray-analysis. For a list of Grosseteste's optical works and their manuscript-traditions, see Lindberg, *Catalogue*, pp. 57-62.

²⁸³See *Perspectiva*, I, 7.2, in Lindberg, *Roger Bacon and the Origins*, p. 101: "... Ptolemy, in his *Book of Optics*, ... presented this science [i.e., *perspectiva*] before Alhacen—a science that Alhacen took from Ptolemy and expounded."

²⁸⁴According to Lindberg's count, Euclid's *Optics*, which was transmitted in several different versions, including a fifteenth-century Italian translation, is represented by 44 manuscripts; Euclid's *Catoptrics* exists in 52 manuscripts; Ptolemy's *Optics* survives in 15 manuscripts; Pseudo-Euclid's *De speculis* exists in 18 manuscripts; Tideus' *De speculis* survives in 15 manuscripts; and al-Kindi's *De aspectibus* is represented by 14 manuscripts. For details, see Lindberg, *Catalogue*, pp. 21-22, 46-56, and 76-77.

²⁸⁵Euclid's *Catoptrica* was published in 1504 on the basis of a Renaissance translation drawn from the Greek text; see Lindberg, *Catalogue*, p. 55. For details on the contemplated publication of Ptolemy's *Optics*, see Smith, *Ptolemy's Theory*,

p. 9.

²⁸⁶Cf., however, Gérard Simon, *Le regard, l'être et l'apparence dans l'Optique de l'Antiquité* (Paris: Seuil, 1988). Simon points out quite rightly that the direction of radiation can make some subtle, but fundamental difference, in how optical phenomena are construed.

²⁸⁷Only the first third or so of the work published in 1611 under the title *Photismi de lumine* comprises the *Photismi* itself; the remainder of the book comprises three short treatises on refraction, the last of these dealing with the eye. This latter treatise was completed in 1554, some 33 years after the *Photismi* itself. Maurolyco himself claims solid grounding in Perspectivist optics on the basis of reading the treatises of Bacon and Pecham: *Quod et in expositionem perspective tam Rogerij Bacchonis, quàm Io. Petsan feceramus* (*Photismi*, p. 73).

²⁸⁸For Maurolyco's full analysis of the problem, see *ibid.*, pp. 73-80.

²⁸⁹*Ibid.*, pp. 76-77.

²⁹⁰The Latin texts upon which these three English passages are based read as follows: [1] *Radii visuales ad coincidentiam properantes, minime proveniunt ad remotiora dispicienda* (*Photismi*, p. 77); [2] *Expansiores radii ad longius spectandum feruntur, concursu iam protelato* (*Photismi*, p. 77); [3] *Item concauis conspiciis breuem obtutum extendi, atque conuexis longum breuiari; quoniam scilicet illis collecti dilatantur, his vero dilatati colliguntur radii* (*Photismi*, p. 79)

²⁹¹For further discussion of this point within the broader context of medieval lens-theory, see Smith, "Ptolemy, Alhazen, and Kepler and the Problem of Optical Images," *Arabic Sciences and Philosophy* 8 (1998): 9-44.

²⁹²"The Sidereal Messenger," trans. Albert Van Helden, *Sidereus Nuncius or The Sidereal Messenger* (Chicago: University of Chicago Press, 1989), pp. 38-39 see also p. 50. At the end of this brief explanation, Galileo promises to "publish a complete theory" at some later occasion, a promise he never fulfills.

²⁹³Galileo's competence in optics is evident from his brief *Theorica speculi concavi sphaerici* in Antonio Favaro, ed., *Le opere di Galileo Galilei*, vol 3.2 (Florence: Barbèra, 1907), p. 869. This treatise is in fact copied from an original by Ausonius; for details see Sven Dupré, "Mathematical Instruments and the 'Theory of the Concave Spherical Mirror': Galileo's Optics beyond Art and Science," *Nuncius: Annali di storia della scienza* 15 (2000): 551-588.

²⁹⁴See Mario Biagioli, *Galileo Courtier* (Chicago: University of Chicago Press, 1993) for a lengthy discussion of the critical importance of reputation to Galileo in his lifelong search for preferment and patronage. For further discussion of the implications of Galileo's discussion of the telescope, see A. Mark Smith, "Practice vs theory: the background to Galileo's telescopic work," *Atti della Fondazione Giorgio Ronchi* 56 (2001): 149-162.

²⁹⁵See p. lvii above.

²⁹⁶Another example of this tendency to compartmentalize is the continuing, albeit uneasy, coexistence of the Aristotelian model of cosmology, which is based on homocentric spheres, and the Ptolemaic model of astronomy, which is based on eccentrics, equants, and epicycles. For a brief discussion of the acceptance

of Hunayn's model of the eye among medical thinkers of the Middle Ages and Renaissance—including Andreas Vesalius—see Smith, "Problem of Optical Images."

²⁹⁷For a discussion of Renaissance instrumentalism and some possible causes for it, see Smith, "Knowing Things Inside Out: The Scientific Revolution from a Medieval Perspective," *The American Historical Review* 95 (1990): 726-744; see also pp. xcvi-xcix above for some amplification of this point. There is good reason to believe that, at least as far as cosmology is concerned, Galileo was anything but an instrumentalist, and that, to the contrary, he was convinced of the absolute truth of the Copernican model and the absolute falsity of the Aristotelian/Ptolemaic alternative. Hence, if Galileo's explanation of the telescope was truly instrumentalist, then either he was disingenuous in offering it, or he had yet to be convinced that human reason is capable of true understanding.

²⁹⁸For a detailed explanation and justification of this schema, see Lindberg, *Theories of Vision*, pp. 143-146.

²⁹⁹*Ibid.*, pp. 122-132.

³⁰⁰*Ibid.*, pp. 132-139.

³⁰¹*Ibid.*, pp. 139-142.

³⁰²See Richard Newhauser, "Der 'Tractatus moralis de oculo' des Petrus von Limoges und seine *exempla*," in Walter Haug und Burghard Wachinger, eds., *Exempel und Exempel-sammlungen* (Tübingen: Max Niemeyer Verlag, 1991), pp. 95-136.

³⁰³For a more detailed discussion of these and other visual analogies used by Peter, see Dallas Denery, "Seeing and Being Seen: Vision, Visual Analogy and Visual Error in Late Medieval Optics, Theology and Religious Life" (PhD dissertation, Berkeley: University of California, 1999).

³⁰⁴See Heather Phillips, "John Wyclif and the Optics of the Eucharist," in Anne Hudson and Michael Wilks, eds., *From Ockham to Wyclif* (Basil Blackwell, 1987), pp. 245-258. The account that follows is based upon her discussion.

³⁰⁵See Phillips, "John Wyclif," p. 249. Alhacen's analysis of the distortions these seven types of mirror can create is to be found in book 6 of the *De aspectibus*.

³⁰⁶See pp. lxxxviii-lxxxix above.

³⁰⁷See note 266, p. cxliv above.

³⁰⁸For an excellent summary account, see Richard C. Dales, *The Problem of the Rational Soul in the Thirteenth Century* (Leiden: E. J. Brill, 1995).

³⁰⁹According to the Augustinian tradition, the Christian believer can "see" the universal Truth of the particular data of sense-induction by means of Christ's divine light. Christ therefore teaches us the Truth by showing it to us. Within the Aristotelian tradition as mediated by the likes of Avicenna and Averroes, our ability to realize the truth of what we abstract from sensible particulars depends upon a generalized Agent Intellect that gives us the true Universal. Thus, it is only through access to this grand repository of forms that we are can achieve actual knowledge. Moreover, in this case, belief is irrelevant, since we all have the potential to know and can have this potential fulfilled by cooperat-

ing with the Agent Intellect. The conflation of these two positions during the first half of the thirteenth century resulted in what Etienne Gilson called "Avicennizing Augustinianism" in his classic study, "Les sources Gréco-Arabes de l'Augustinisme Avicennisant," *Archives d'histoire doctrinale et littéraire du moyen âge* 4 (1929): 5-149.

³¹⁰If the Agent or Active Intellect is common to, yet transcends the individual, potential intellect, then the personal soul, insofar as it is immortal, cannot carry with it the knowledge gained in life, since that knowledge can only be actualized in and by the Agent Intellect. Or, to put it another way, the immortality of our intellectual souls is common rather than personal and individual. Along with several other problematic positions (e.g., the eternity of the world), the doctrine of a higher, common intellect was ultimately anathematized in the Condemnations of 1277, after which both the doctrine of divine illumination and that of the Agent Intellect fell out of favor; for a thumbnail sketch, see John F. Wippel, "The condemnations of 1270 and 1277 at Paris," *The Journal of Medieval and Renaissance Studies* 7 (1977): 169-201.

³¹¹For an admirably comprehensive, nuanced, and lucid account of this undertaking during roughly the first half of the fourteenth century—i.e., from the time of Duns Scotus (d. 1309) and Peter Aureol (d. 1322) to the final condemnation of Nicholas of Autrecourt in 1347—see Katherine Tachau, *Vision and Certitude in the Age of Ockham: Optics, Epistemology and the Foundations of Semantics, 1250-1345* (Leiden: E. J. Brill, 1988). Among several important points Tachau makes in this study is that Ockham was far less influential as a source for the epistemological critique of the fourteenth century than has generally been supposed. For a more recent study that covers much the same ground in a more cursory way, but with a sharper theological focus, see Denery, "Seeing and Being Seen," esp. pp. 133-219.

³¹²See pp. lxiv-lxvi above.

³¹³Nicholas of Autrecourt, for example, suggests a particle-theory of light-transmission based on atomism, but he does not attempt to develop a detailed account on the basis of that suggestion; see Tachau, *Vision and Certitude*, pp. 349-350.

³¹⁴See, for example, Denery, "Seeing and Being Seen," pp. 196-200; see also pp. 21-220.

³¹⁵See Tachau, *Vision and Certitude*, pp. 353-383.

³¹⁶This instrumentalist view of hypothesis is clearly grounded in the notion of probability discussed just above. Accordingly, a given hypothesis is deemed probable not because it is assumed to reflect how things actually are but because it effectively describes how things appear to be.

³¹⁷See, e.g., Étienne Gilson, *Reason and Revelation in the Middle Ages* (New York: Scribner's, 1938); Armand Maurer, *Medieval Philosophy* (New York: Random House, 1962); and Gordon Leff, *The Dissolution of the Medieval Outlook: An Essay on Intellectual and Spiritual Change in the Fourteenth Century* (New York: New York University Press, 1976).

³¹⁸See, e.g., E. A. Moody, "Empiricism and Metaphysics in Medieval Philosophy," *Philosophical Review* 67 (1958: 145-163); William A. Wallace, *Causality and Scientific Explanation*, vol. 1 (Ann Arbor: University of Michigan Press, 1972); and Edward Grant, *Much Ado about Nothing: Theories of Space and Vacuum from the Middle Ages to the Scientific Revolution* (Cambridge/New York: Cambridge University Press, 1981) and *The Foundations of Modern Science in the Middle Ages* (Cambridge: Cambridge University Press, 1996).

³¹⁹See, e.g., Anneliese Maier, *Die Vorläufer Galileis im 14. Jahrhundert: Studien zur Naturphilosophie der Spätscholastik*, 2nd ed. (Rome: Edizioni di storia e letteratura, 1966); for a useful overview of Maier's work, see Steven D. Sarjent, ed. and trans., *On the Threshold of Exact Science* (Philadelphia: University of Pennsylvania Press, 1982). See also Marshall Clagett, *The Science of Mechanics in the Middle Ages* (Madison: University of Wisconsin Press, 1959), and Edward Grant, *In Defense of the Earth's Centrality and Immobility: Scholastic Reaction to Copernicanism in the Seventeenth Century* (Philadelphia: American Philosophical Society, 1984).

³²⁰Particularly telling in this regard is Maurolyco's agreement that the anterior surface of the crystalline lens "accepts species and, having received them, passes them through the optic nerve to the common sense for its judgment" *Photismi*, p. 70.

³²¹See p. lxxxiv above.

³²²Idem.

³²³It is worth noting that the image formed on the retina is a real, physical image and that, in recognition of this fact, Kepler calls it a "depiction" (*pictura*). On the other hand, the image formed at the anterior surface of the lens is virtual, not real, and therefore a quasi-psychological rather than a physical construct. Hence, Kepler's account of image-formation allows no room for the succession of abstractions from visible, through sensible, to intelligible species that provides the basis for the Perspectivist account of sense-cognition.

³²⁴For the actual loci of these quotations, see Smith, *Descartes's Theory of Light and Refraction*, pp. 14 and 45.

³²⁵Descartes analyzed the physical universe according to three kinds of elemental particles that were distinguished from one another by size and shape. The smallest particles, infinitesimal in size, composed what he called Fire. Air consisted of larger, but still quite small, particles that were perfectly spherical. Earth, finally, consisted of even larger, crasser particles of various shapes. As a whole, these particles formed a plenum through perfect contiguity.

³²⁶For a more complete and detailed description of Descartes's theory of light, see Smith, *Descartes's Theory of Light and Refraction*, pp. 13-19.

³²⁷Over the course of several years after publication of the *Dioptrique*, Descartes attempted in various ways to explain how, according to his mechanistic model of sight, we are able to gain a proper impression of the spatial properties of things. Surely the most notorious of these attempts was his effort to explain the problem away on the basis of the pineal gland and its mediating role be-

tween pure physical sensation and cognition. For a useful account of these attempts (and their ultimate failure), see Celia Wolf-Devine, *Descartes on Seeing: Epistemology and Visual Perception* (Carbondale and Edwardsville, Ill.: Southern Illinois University Press, 1993).

³²⁸Giotto and Michelangelo provide only the roughest limits to this development. The tendency toward naturalism in Renaissance art, at least in Italy, is discernible in the thirteenth century, and artists continued to paint naturalistically well after the death of Michelangelo.

³²⁹Another striking example of such image-distortion is Parmigianino's self-portrait of 1524, which reflects quite self-consciously the distorted view he had of himself in a convex mirror.

³³⁰For an especially clear photographic resolution of this anamorphic distortion, see Susan Foister, Ashok Roy, and Martin Wyld, *Holbein's Ambassadors: Making and Meaning* (London: National Gallery Publications, 1997), pp. 90-96.

³³¹See Robert Gibbs, *Tomaso da Modena: Painting in Emilia and the March of Treviso, 1340-80* (Cambridge: Cambridge University Press, 1989), p. 85. That such reading mirrors were in common use well into the sixteenth century is evident from Giovanbattista Palatino's description of 1540: "The [concave] mirror is used to save the sight and to assist it in continuous steady writing. It is much better of glass than of steel," trans. Henry K. Pierce, *The Instruments of Writing* (Newport, RI: Berry Hill Press, 1953).

³³²For elaboration, see Vincent Ilardi, "Renaissance Florence: The Optical Capital of the World," *The Journal of European Economic History* 22 (1993): 507-541.

³³³"I remember" Maurolyco mentions in an aside to his discussion of lenses, "that in times past the makers of glasses were so diligent that they advertised with small marks inscribed [somewhere on the glasses] the age, according to the number of years, to which the glasses were properly suited," *Photismi*, p. 79.

³³⁴*The Heritage of Giotto's Geometry: Art and Science on the Eve of the Scientific Revolution* (Ithaca: Cornell University Press, 1991), pp. 47-87.

³³⁵See, e.g., Leon Battista Alberti's account of chiaroscuro in the second book of the *Della pittura*, trans. John R. Spencer, *Leon Battista Alberti On Painting* (1956; rev. ed. New Haven: Yale University Press, 1966), pp. 81-83.

³³⁶As Alberti puts it in the prologue to *Della pittura*, "I used to marvel and at the same time grieve that so many excellent and superior arts and sciences from our most vigorous antique past could now seem lacking and almost wholly lost. We know from [remaining] works and through references to them that they were once widespread. Painters, sculptors, architects, musicians, geometricians, rhetoricians, seers and similar noble and amazing intellects are rarely found today and there are few to praise them. Thus I believed, as many said, that Nature . . . no longer produced either geniuses or giants which in her more youthful and more glorious days she had produced so marvellously and abundantly," Spencer, *On Painting*, p. 39; see also pp. 63-67.

³³⁷That classical painters and architects were convinced, at least to some

extent, that a knowledge of optics is useful for their craft is evident from Vitruvius' claim, in the first chapter of book I of *De architectura*, that the architect should be well versed in all the liberal arts, including optics; see esp. I, 1.4 and 16 in Frank Granger, trans., *Vitruvius: De architectura, Books I-V* (Cambridge, Mass.: Harvard University Press, 1931), pp. 9 and 21.

³³⁸See, e.g., J. Playfair McMurrich, *Leonardo da Vinci, the Anatomist (1452-1519)* (Baltimore: Williams & Wilkins, 1930). The same desire to understand the workings of nature that inspired Leonardo's anatomical research is evident in Alberti's observation that "before dressing a man we first draw him nude, then we enfold him in draperies. So in painting the nude we place first his bones and muscles which we then cover with flesh so that it is not difficult to understand where each muscle is beneath," Spencer, *On painting*, p. 73.

³³⁹For full documentation, see Graziella Vescovini, "Alhazen Vulgarisé: Le *De li aspecti* d'un manuscrit du Vatican (moitié du XIV^e siècle) et le troisième commentaire sur l'optique de Lorenzo Ghiberti," *Arabic Sciences and Philosophy* 8 (1998): 67-96.

³⁴⁰Leonardo's Italian version of the prologue to Pecham's *Perspectiva communis* can be found in Jean Paul Richter, ed., *The Literary Works of Leonardo da Vinci* (London/New York: Oxford University Press, 1939), p. 117. Among the three citations of Witelo ("Vitulone") in the above collection, one includes Leonardo's observation that "In Vitulone sono 805 conclusioni in prospettiva" (*ibid.*, vol. 2, p. 377; see also pp. 348 and 361). For Leonardo's ruminations on optics and its relationship to linear perspective, see *ibid.*, vol. 1, pp. 127-161. Unlike Alberti (see pp. cvii-cviii above), Leonardo explicitly rejects the visual-ray model in favor of the visible radiation model, so his analysis of sight is based throughout on the cone of radiation described by Alhacen and his Perspectivist followers.

³⁴¹Bruce S. Eastwood, "Alhazen, Leonardo, and Late-Medieval Speculation on the Inversion of Images in the Eye," *Annals of Science* 43 (1986): 413-446.

³⁴²For a good thumbnail sketch of Leonardo's optical ideas, see Lindberg, *Theories of Vision*, pp. 154-168.

³⁴³Manetti, *Vita di Brunelleschi*, ed. and trans., Howard Saalman and Catherine Enggass, *The Life of Brunelleschi by Antonio di Tuccio Manetti* (University Park: Pennsylvania State Press, 1970), p. 42. Saalman and Enggass offer a tentative date of around 1482 for the composition of Manetti's *Vita*.

³⁴⁴For the relevant passages in Manetti upon which these reconstructions are based, see *ibid.*, pp. 42-46.

³⁴⁵See Spencer, *On Painting*, pp. 39-40. The Latin version of this treatise, *De pictura*, was probably composed in 1435.

³⁴⁶*Ibid.*, p. 56

³⁴⁷*Ibid.*, p. 58.

³⁴⁸For the full narrative from which this description of Alberti's projection-technique is derived, see *ibid.*, pp. 56-58. For a diagrammatic exposition, see pp. 110-112.

³⁴⁹See *ibid.*, pp. 45-48.

³⁵⁰*Ibid.*, p. 46.

³⁵¹*Ibid.*, p. 47.

³⁵²See, e.g., Graziella Vescovini, *Studi sulla prospettiva medievale* (Torino: Università di Torino, 1965) and Samuel Edgerton, *The Renaissance Rediscovery of Linear Perspective* (New York: Basic Books, 1975).

³⁵³C. D. Brownson, "Euclid's Optics and its Compatibility with Linear Perspective," *Archive for History of Exact Sciences* 24 (1981): 165-194.

³⁵⁴See Martin Kemp, *The Science of Art: Optical Themes in Western Art from Brunelleschi to Seurat* (New Haven: Yale University Press, 1990). Brunelleschi, of course, was responsible for the design and construction of the dome to Florence's cathedral. That he was not alone among Renaissance artists in combining the skills of painting and engineering is clear. Leonardo, for instance, is notorious for his machine-designs, and Albrecht Dürer (d. 1528) was deeply interested in what constituted higher mathematics (i.e., the study of conic sections) in his day. For a good, standard survey of the relationship between art and engineering in the Renaissance, see Bertrand Gille, *Engineers of the Renaissance* (Cambridge, Mass.: M.I.T. Press, 1966).

³⁵⁵To understand the play and light of shadow properly requires an understanding of how light is projected from its source. If we take that source to be a point, then the projected light forms a "cone" of radiation whose vertex lies at the source and whose base is formed on whatever surface the light shines upon. Thus, the cone of light-projection can be analyzed according to the same mathematical rules as the cone of vision in linear perspective.

³⁵⁶The Latin text of this quotation, which is reproduced in facsimile in William M. Ivins, *On the Rationalization of Sight* (New York: Da Capo, 1973), reads as follows: *Etenim (quod philosophicis speculationibus perspectum est) omnes res videntur tanquam per lineas ab oculo egredientes: scilicet per triangulum. Cuius basis est res visa: eiusque diameter super partes ipsius rei vise discurrit. Sed lux ab oculo non egreditur: verum ex lucis exterioris splendore in oculum cadente, fit reflexio quasi a speculo ignito: per quam forme rerum concipiuntur.* Viator's reference to a "triangle," rather than to a cone, formed by the visual rays echoes Alberti's description in the first book of *Della pittura*: "It is said that vision makes a triangle. The base of [this triangle] is the quantity seen and the sides are those rays which are extended from the quantity to the eye," Spencer, *On Painting*, p. 47.

³⁵⁷Edgerton, *Heritage*, p. 93.

³⁵⁸For the full argument, see *ibid.*, pp. 91-107.

³⁵⁹Summers, *The Judgment of Sense: Renaissance Naturalism and the Rise of Aesthetics* (Cambridge: Cambridge University Press, 1987).

³⁶⁰The source of this interpretation is Panofsky's seminal *Idea* of 1924.

³⁶¹*Judgment of Sense*, p. 2.

³⁶²*Idem.*

³⁶³See esp. chaps. 1, 2, 5, and 8.

³⁶⁴*Judgment of Sense*, p. 316.

³⁶⁵Quoted in *ibid.*, p. 319.

³⁶⁶See *ibid.*, pp. 170-177.

³⁶⁷*Ibid.*, p. 176.

³⁶⁸See, e.g., Steven Straker, "The Eye Made 'Other': Dürer, Kepler, and the Mechanisation of Light and Vision," *The University of Calgary Studies in History* 1 (1976): 7-25; Edgerton, *Heritage*, esp. pp. 108-289; and Mary G. Winkler and Albert Van Helden, "Representing the Heavens: Galileo and Visual Astronomy," *Isis* 83 (1992): 195-217.

³⁶⁹*The New York Times Magazine*, Sunday, April 18, 1999, pp. 80-83

³⁷⁰*De aspectibus*, I, 6.61, p. 374 below.

³⁷¹For a description and explanation of this instrument, see Saleh Omar, *Ibn al-Haytham's Optics: A Study of the Origins of Experimental Science* (Minneapolis: Bibliotheca Islamica, 1977).

³⁷²To be original is not necessarily to be "revolutionary." Conversely, to be "revolutionary" is not necessarily to be original. Copernicus' heliocentric hypothesis is a good case in point; many thinkers before him had entertained the possibility—purely hypothetical in most cases—that the earth moves. In the case of Ibn al-Haytham, however, there is a tendency among some scholars to conflate "original" and "revolutionary," and my response to that conflation is in no way based upon an acceptance of its validity.

³⁷³The notion of scientific "revolution" has its origins in political thought, where revolution is understood in terms of overturning—a particular governmental system being entirely overthrow in favor of another. The classic account is to be found in Crane Brinton's *The Anatomy of Revolution* (1938; rev. ed. New York: Random House, 1965), where Brinton provides a morphology of political revolution according to preconditions, triggers, revolution, and aftermath. In the context of this model, a scientific revolution would follow the same morphology, the result being the overthrow and replacement of an old theoretical system (e.g., Ptolemaic cosmology) by an entirely new one (i.e., Copernican cosmology). The alternative model provided by T. S. Kuhn in *The Structure of Scientific Revolutions* (Chicago: University of Chicago Press, 1962) characterizes scientific revolution in terms not of overturning but of a gestalt-shift that results in an entirely different way of looking at the same phenomena. Such a gestalt-shift is the result of "crisis" arising from the inability of current theory to resolve various anomalies. According to Kuhn, then, the process of revolution is less psychologically or socially disruptive than it is according to Brinton. Neither model seems applicable to Ibn al-Haytham. On the one hand, he did not so much overturn as perfect earlier theory. On the other, his account of vision does not entail a gestalt-shift insofar as the terms of his analysis are essentially the same as those of his classical forebears.

³⁷⁴Smith, "Getting the Big Picture."

³⁷⁵For instance, Descartes's and Hooke's erroneous supposition that color is a modification of white light was instrumental in the development of Newton's

counter-theory that white light is a composite of all colors. Likewise, Dufay's two-fluid theory of electricity (vitreous and resinous) was instrumental as the foil against which Franklin responded in developing his one-fluid counter-theory.

MANUSCRIPTS AND EDITING

The manuscripts: At present twenty-two manuscripts containing all or part of Alhacen's *De aspectibus* are known to exist. Of these twenty-two, seventeen are either complete or almost so. In addition, there exist two other versions of the treatise: a fourteenth-century Italian translation represented in one manuscript and Friedrich Risner's printed edition of 1572. Altogether, then, at least twenty-four versions of the *De aspectibus* are extant in one form or another. They are given in the following list,¹ along with relevant sigla and descriptions. I have subdivided the list into four categories for the sake of later discussion and analysis.

PRIMARY MANUSCRIPTS

1. *E* Edinburgh, Royal Observatory, Crawford Library: MS Cr.3.3, ff 2r-186r—thirteenth century.

Written on parchment, this manuscript contains copious inter-linear and marginal corrections in a second hand that belongs to a certain Guido de Grana, author of the colophon rendered below. It also includes copious summary glosses in a third hand, as well as a variety of diagrams that themselves represent glosses of a sort. The incipit/title attributes the treatise to "Alacen filii alhaycen." Ibn Mu'ādh's *De crepusculis* is appended at the end without attribution in the original text, although a marginal attribution to Ibn Mu'ādh is provided by the aforementioned Guido de Grana: *Liber de nubium ascensione cuius verus titulus est iste: Incipit liber abomadhi malfagar, id est de crespusculo matutino et vespertino et ssafac; verba eius: Ostendere quid sit crepusculum.* Dated 1269, the colophon reads as follows: *Ego magister Guido dictus de Grana correxi diligenter istos duos libros, scilicet perspectivam alhacen et librum de ascensionibus nubium, iuxta exemplar magistri Iohannis Lundoniensis quod ipsemet diligenter correxit ut dicitur. Completa fuit correctio horum librorum anno domini m.cc.lx. nono. quinto ydus maii, scilicet in vigilia penthecostes.* This manuscript is very closely related to the manuscript listed in entry 6 below. Catalogue reference: N. R. Ker, *Medieval Manuscripts in British Libraries*, vol. 2

(Oxford: Clarendon Press, 1977), pp. 559-60.

2. **C1** Cambridge, Trinity College: MS 0.5.30, ff. 1r-165r—thirteenth century.

Written on parchment in double-column format, this manuscript has suffered considerable water-damage. Indeed, the first fifteen folios are so permeated by rot as to be mostly unreadable, and subsequent portions are extremely difficult to decipher because of the ink's being partially washed off. The explicit reads: *Explicit liber hacen filii hucaym filii haycen de aspectibus*. Catalogue reference: M. R. James, *The Western Manuscripts in the Library of Trinity College Cambridge: A Descriptive Catalogue*, vol. 3 (Cambridge: Cambridge University Press, 1902), pp. 330-331.

3. **Er** Erfurt, Wissenschaftliche Bibliothek: MS Ampl F.392, ff 1r-143v—late thirteenth century.

Written on parchment in double-column format, this manuscript contains a fair number of interlinear and marginal corrections in the original hand as well as in a second hand. Catalogue reference: *Beschreibendes Verzeichniss der Amplonianischen Handschriften-Sammlung zu Erfurt* (Berlin: Weidemannsche Buchhandlung, 1887), p. 275.

4. **L3** London, Royal College of Physicians: MS 383, ff 1r-132r—thirteenth century.

Written on parchment in double-column format, this manuscript lacks all of the first book to paragraph 107 of the sixth chapter (see p. 384 of the critical Latin text below), that portion probably corresponding to the first 12-folio signature. The incipit to book 4 attributes the treatise to *Hacen filii Hucam filli Haicen*. Catalogue reference: N. R. Ker, *Medieval Manuscripts in British Libraries*, vol. 1 (Oxford: Clarendon Press, 1969), pp. 211-212.

5. **P1** Paris, Bibliothèque Nationale: MS Lat 7247, ff. 1r-107v—fourteenth century.

Written on parchment, this manuscript contains version 1 of chapter 3 of book 3 (see below, pp. clxi and clxviii-clxix). At the top of the first folio the title "ALHACEN PERSPECTIVA" has

been added in a much later hand. The explicit reads: *Explicit liber septimus Alhacen*. Catalogue reference: *Catalogus codicum manuscriptorum bibliothecae regiae*, vol. 4 (Paris: 1744), p. 331.

6. **P3** Paris, Bibliothèque Nationale: MS Lat 7319, ff 1r-340v—late thirteenth/fourteenth century.

Written on parchment, this manuscript is either a direct copy, or a copy from a close intermediate version, of the Edinburgh manuscript in entry 1, p. clv above. Not only does it contain the same glosses, but it has at least one marginal notation in a hand that is much like that of Guido de Grana, the primary corrector of *E* (see entry 1 above). It also contains most of the diagrams in *E*. Like *E*, this manuscript has an incipit ascribing the treatise to *Alhacen filii Alhaycen*, and it includes Ibn Mu'ādh's *De crepusculis* at the end, without attribution in the original but with a marginal ascription that reads as follows: *Incipit liber de ascensionibus nubium. Verus titulus est iste: incipit liber abomadhi malfagar, id est de crepusculo matutino et vespertino et ssaphac; verba eius: Ostendere etc.* Catalogue reference: *Catalogus codicum manuscriptorum bibliothecae regiae*, vol. 4 (Paris: 1744), p. 386.

7. **S** Saint-Omer, Bibliothèque Municipale: MS 605, ff 1r-153v—fourteenth century.

Written on parchment in double-column format, this manuscript probably originates from the famous local abbey of St. Bertin. It contains a fair number of interlinear and marginal corrections, most of them in a second hand. Along with version 1 of the third chapter of book 3 (see below, pp. clxi and clxviii-clxix), this manuscript also includes Ibn Mu'ādh's *De crepusculis* at the end without attribution but with the following introductory explicit/incipit: *Explicit liber hacen filii hucayn filii haycen De aspectibus. Incipit liber de ascensionibus nubium ? hoc modo*. Catalogue reference: *Catalogue générale des manuscrits des bibliothèques publiques des départements*, old series, vol. 3 (Paris: 1861), p. 265.

SECONDARY MANUSCRIPTS

8. **F** Florence, Biblioteca Nazionale Centrale: MS II.III.324, ff 1r-136v—fifteenth century.

Written on parchment in double-column format, this manuscript includes version 1 of the third chapter of book 3 (see below, pp. clxi and clxviii-clxix). However, it lacks all of book 1 up to the first paragraph of chapter 7 (see p. 355 of the critical Latin text below). It also lacks most of book 2, the missing portion extending from paragraph 25 of chapter 2 to paragraph 205 of chapter 3 (see pp. 427-505 of the critical Latin text below). In addition, it lacks the final part of chapter 7 of the seventh book. Catalogue reference: G. Mazzatinti, *Inventari dei manoscritti delle biblioteche d'Italia*, vol. 10 (Florence: Forli, 1900), p. 38.

9. **O** Oxford, Corpus Christi College: MS 150, ff. 1r-112r—thirteenth century.

Written on parchment, this manuscript contains version 1 of the third chapter of book 3 (see below, pp. clxi and clxviii-clxix). Aside from numerous corrections, it contains a series of interpolations and misplaced sections between ff 42r and 47v. Catalogue reference: Henry O. Coxe, *Catalogus codicum manuscriptorum qui in collegiis aulisque Oxoniensibus hodie adservantur*, part 2 (Oxford, 1852), p. 59.

10. **Va** Vatican, Biblioteca Apostolica: MS Palat Lat 1355, ff 1r-147r—thirteenth century?

Written on parchment in double-column format and containing numerous interlinear and marginal corrections in a later hand, this manuscript contains version 1 of chapter 3 of book 3 (see below, pp. clxi and clxviii-clxix). It also contains Ibn Mu'ādh's *De crepusculis*, which is appended to Alhacen's treatise without any explicit attribution. The explicit reads: *Explicit liber achen filii hucaym filii aycen de aspectibus*.

11. **V2** Brugge, Stedelijke Openbare Bibliotheek: MS 512, ff 1r-113v—thirteenth century.

Written on parchment, this manuscript contains version 1 of the third chapter of book 3 (see below, pp. clxi and clxviii-clxix). It opens with the following inscription in a hand other than that of the primary scribe: *sermo libri achen filii lucayn filli allhacen de aspectibus, et est tractatus primus, et sunt in toto libro septem tractatus*. Written in the original hand, its explicit reads: *Explicit liber achen*

filiu hucaym filii aycen de aspectibus. Catalogue reference: L'Abbé A. de Poorter, ed., *Catalogue des manuscrits de la bibliothèque de la ville de Bruges*, vol. 2 (Paris: Société d'Édition Les Belles Lettres, 1934), p. 512.

TERTIARY MANUSCRIPTS

12. **C2** Cambridge, University Library: MS Peterhouse 209, ff 1r-111v—fourteenth century.

Written on parchment, this manuscript contains Ibn Mu'ādh's *De crepusculis*, which is appended to Alhacen's treatise without any explicit attribution. It attributes the treatise to *Alhacen filii Alhachen* at the beginning of book 6, chapter 7. Catalogue reference: M. R. James, *A Descriptive Catalogue of the Manuscripts in the Library of Peterhouse* (Cambridge: Cambridge University Press, 1899), p. 251.

13. **L1** London, British Library: MS Royal 12.G.7, ff 1r-102v—fourteenth century.

Written on parchment in double-column format, this manuscript contains Ibn Mu'ādh's *De crepusculis*, which is appended to Alhacen's treatise without any attribution. The explicit at the end of the seventh book reads: *Explicit liber de aspectibus*. The explicit at the end of Ibn Mu'ādh's treatise reads: *Explicit Alacen in scientia perspectiva*. This manuscript is undoubtedly the source of the Italian translation described below in entry 18. Catalogue reference: George F. Werner and Julius P. Gilson, eds., *Catalogue of Western Manuscripts in the Old Royal and King's Collection*, vol. 2 (1921), p. 72.

14. **L2** London, British Library: MS Sloane 306, ff. 14-177v—fourteenth century.

Written on parchment. Catalogue reference: *Catalogus librorum manuscriptorum Bibliothecae Sloanianae* (unpublished), p. 48.

15. **M** Munich, Bayerische Staatsbibliothek: MS CLM 10269, ff. 1r-160r—fourteenth century.

Written on parchment. The explicit reads: *Explicit liber hacen filii*

huchaym filii haicen de aspectibus. Catalogue reference: Karl Halm and Wilhelm Meyer, *Catalogus codicum latinorum bibliothecae regiae Monacensis*, vol. 1, fasc. 2 (Munich: 1874).

16. **P2** Paris, Bibliothèque Nationale: MS Lat. 16199, ff 1r-277v--sixteenth century.

Written on paper in a cursive hand, this manuscript contains Ibn Mu'ādh's *De crepusculis*, which is appended to Alhacen's treatise as book eight but without any explicit attribution. The incipit reads: *Incipit primus tractatus alhacen filli alhazen de aspectibus, et 7 sunt differentie*. Catalogue reference: Léopold Delisle, *Inventaire des manuscrits de la Sorbonne conservés à la bibliothèque impériale sous les numéros 15176-16718 du fonds latins* (Paris: 1870), p. 46.

17. **V1** Vienna, Österreichische Nationalbibliothek: MS 5322, ff 1r-270r—fifteenth century.

Written on paper in a cursive hand, this manuscript contains Ibn Mu'ādh's *De crepusculis*, which is appended to Alhacen's treatise without any explicit attribution. The incipit of the treatise reads as follows: *Perspectiva Alacen liber primus*. The explicit to book 1 reads: *Explicit primus liber Alacen de aspectibus*. Catalogue reference: *Tabulae codicum manu scriptorum praeter graecis et orientales in Bibliotheca Palatine Vindobonensis asservatorum*, vol. 4 (Vienna: 1870), p. 102.

OTHER VERSIONS

18. **I** Vatican, Biblioteca Apostolica: MS Lat. 4595, 1r-177v—fourteenth century.

Written on parchment, this Italian translation of the *De aspectibus* contains Ibn Mu'ādh's *De crepusculis*, which is appended to Alhacen's treatise without any explicit attribution. Its Latin source is the manuscript listed under entry 13 above.² This translation was used by Lorenzo Ghiberti in the framing of his three commentaries on art and vision, particularly the *commentario terzo*.³

19. **R** Friedrich Risner, *Opticae thesaurus: Alhazeni arabis libri septem, . . . eiusdem liber de crepusculis et nubium ascensionibus. Item Vitellonis*

Thuringopoloni libri X (Basel, 1572).

The first printed edition of the *De aspectibus*, this book includes an edition of Witelo's *Perspectiva*, which was heavily dependent upon Alhacen's treatise. This constitutes a genuine edition, not simply another version, insofar as Risner took pains to "modernize" the Latin in terms of grammatical structure, vocabulary, and spelling. In addition, he imported his own structure into the text, breaking it up into theorems and adding his own enunciations. As the title indicates, Risner's edition includes Ibn Mu'ādh's *De crepusculis*, ascribing it to Alhacen, or "Alhazen" in his rendering.⁴

FRAGMENTARY TEXTS

20. Cracow, Bibl. Jagiellonska: MS 569, pp. 247-50.
21. Erfurt, Wissenschaftliche Bibl.: MS Amp. Q.23, ff. 72r-74v
22. Milan, Bibl. Ambrosiana: MS S.100 sup., ff. 4(1)r-8(5)v.
23. Rome, Bibl. Angelica: MS 76, ff. 25r-25v.
24. Vienna, Österreichische Nationalbibl.: MS 2438, ff 144r-147r.

Selection-Procedures: In an effort to pare the list of twenty-two Latin manuscripts down to manageable proportions, I started by excluding the five fragmentary versions, none of which extends beyond a few folios in length. I then fell back upon two basic strategies to cull the remaining seventeen manuscripts. The first strategy involved a comparison of those manuscripts on the basis of gross structural features. A variety of connections came to light through this analysis, but four in particular stand out.

(1) Seven of the manuscripts—*E*, *P3*, *S*, *C2*, *L1*, *P2*, and *V1* (entries 1, 6, 7, 12, 13, 16, and 17)—have Ibn Mu'ādh's brief *De crepusculis et nubium ascensionibus* appended to book 7 of the *De aspectibus*.⁵ With only two exceptions (*E* and *P3* [entries 1 and 6]), this work is treated as an integral part of the *De aspectibus*. Indeed, one manuscript (entry 16) includes it explicitly as book eight.

(2) Six of the manuscripts—*P1*, *S*, *F*, *O*, *Va*, and *V2* (entries 5, 7, 8, 9, 10, and 11)—contain two versions of the third chapter of book 3, both versions of this chapter clearly related yet quite distinct.

(3) Four of the manuscripts—*E*, *P3*, *P2*, and *V1* (entries 1, 6, 16, and 17) share numerous glosses and diagrams that are found in none of the remaining versions. *E* and *P3* are especially close in this regard, so close that *P3* must have been copied directly from *E* or from a very near intermediate version.

(4) A comparative examination of the internal structure (i.e., chapters and subsections) for all seventeen manuscripts, as well as for the Risner edition (*R* in entry 19), indicates clear and close links among *E*, *P3*, *P2*, and *R* (entries 1, 6, 16, and 19). Likewise, this comparison suggests a fairly close relationship among *Va*, *P1*, *F*, *V2*, and *S* (entries 10, 5, 8, 11, and 7), as well as among *C1*, *L3*, *Er*, and *M* (entries 2, 4, 3, and 15)⁶ As we will see later on, these groupings are corroborated by detailed textual similarities.

As far as overlap among these three groupings is concerned, entries 1, 6, and 7 are particularly salient, the first two because they contain Ibn Mu'ādh's treatise and are closely related through glosses and marginal diagrams, the third because it contains Ibn Mu'ādh's treatise as well as version 1 of the third chapter of book 3. Less salient, but nonetheless discernible, is the overlap among the three manuscript-groups (1, 6, 16, 19), (5, 7, 8, 10, 11), and (2, 3, 4, and 15) on the basis of internal structure.

My second strategy entailed a close comparison of textual similarities among manuscripts—sixteen in this case, because *P3* (entry 6) was unknown to me at the time.⁷ The methodological path I followed was essentially the one blazed by Joseph Mogenet nearly five decades ago in his critical edition of Autolycus of Pithane's two treatises on spherical geometry.⁸ At the heart of this methodology is a comparative analysis of shared variants among manuscripts according to nine variant-types. Each of these variant-types is weighted according to the probability of its occurring by chance in more than one manuscript.⁹ For instance, the likelihood that two or more independent scribes would omit the very same phrase by accident or whim is extremely low, as is the likelihood that the two would add the very same phrase by accident or whim. On the other hand, the probability of accidental transpositions (e.g., from "corpus album" to "album corpus") or transformations (e.g., from "punctus" [masc.] to "punctum" [neut.]) is relatively high, no matter how punctilious the scribe. Hence, the omission or addition of a phrase is far more significant than the transposition of a word-couple or the transformation of a single word. The following list gives the nine variant-types ranged in order of relative significance from top to bottom:

1. Omission of a phrase (two or more words)
2. Insertion of a phrase (two or more words)
3. Repetition of a phrase (two or more words)
4. Omission of a single word
5. Insertion of a single word
6. Repetition of a single word
7. Substitution of obviously dissimilar words
8. Transposition
9. Transformation

In order to refine these categories even further, I included corrections, such as the retransposition of an inverted word-couple or the erasure of an added phrase, as partial variants within each type.

For the purposes of overall comparison, I chose *O* (entry 9) as my base-text. In order to make the comparison as broad as possible, I took fifteen textual slices, ranging in size from one to five folios, at relatively equal intervals throughout the 112-folio extent of *O*.¹⁰ Altogether, I selected nearly forty percent of the entire text in order to establish a representatively broad basis for comparison. Then, with the relevant portions of *O* transcribed, I made parallel transcriptions from the fifteen remaining manuscripts so as to establish a complete line-by-line, word-by-word compilation of the full set of fifteen textual slices for all sixteen manuscripts.

On the basis of these parallel transcriptions, I was then able to tabulate variants. By "variant" I meant any reading, repetition, or omission shared by fewer than half the texts. I made no judgment about the correctness or incorrectness of the given reading; I simply treated each variant as a shared trait. The greater the number of these shared traits, the more closely related the manuscripts sharing them should be.

Precisely how this analysis works is illustrated in Table 1 on the following page. It provides a tabulation of shared variants for the fourth textual slice (34r-37r), with *F* as the standard against which the remaining fifteen manuscripts are compared.

TABLE 1

	1	2	3	4	5	6	7	8	9	
F		1.0			2.0	1.0			1.0	23.0
O	1.0			4.0			1.0	1.0	12.0	50.0
E		1.0		1.0	1.5		3.0	1.0	4.0	36.5
L1				1.0	0.5		2.0		3.0	17.5
L2	1.0	1.0		2.0	6.5		3.5	4.0	15.5	<u>95.5</u>
L3		1.0							2.0	10.0
C1		1.0						1.0	6.0	16.0
C2					2.0		1.0		3.5	16.5
P1	3.0	4.0		10.0	13.5		10.0	7.0	36.5	<u>267.0</u>
P2					1.0		2.0		8.0	<u>19.0</u>
M					2.0		1.0		8.5	21.5
V1		1.0							4.0	12.0
V2	3.0	2.0		10.5	1.5		7.0	7.0	30.0	<u>246.0</u>
Er					1.0				5.0	<u>10.0</u>
Va	3.0	2.0		7.5	14.5		11.0	9.0	38.0	<u>249.5</u>
S	2.0	1.0		4.0	8.5		7.5	2.0	27.0	<u>146.0</u>

The top row in the table lists the variant-types by number, from 1 (most significant) to 9 (least significant). The leftmost column lists the manuscripts by sigla, from *F* to *S*. For every manuscript, the number of times each variant-type occurs is tabulated in the appropriate column. The variants listed for *F* are unshared and therefore idiosyncratic. For the remaining manuscripts, however, the listed variants are all shared with *F*.

To illustrate, let us start with *F* itself. According to the tabulations listed from left to right, *F* has added 1 phrase (col. 2), inserted 2 single words (col. 5), repeated 1 single word (col. 6), and transformed 1 word (col. 9)—all of these occurrences being unique to *F*. As we have already established, omitting a phrase is far more significant than transforming a word. How much more? For the sake of convenience, I chose to rank significance in simple arithmetical order. Accordingly, I adjudged omission of a phrase to be nine times as significant as a mere word-transformation; addition of a phrase eight times as significant; repetition of a phrase seven times as significant; and so on down the line. So weighted, a phrase-omission counts for nine points, a phrase-addition for 8, a phrase-repetition for 7, and so forth. Meantime, any correction counts for half a full variant, so that, for example, an inserted phrase that is then erased counts for four points. Accordingly, the overall score for *F* in terms of idiosyncratic variants is as follows: $1 \times 8 + 5 \times 2 + 4 \times 1 + 1 \times 1 = 23$. Using the same algorithm, we can compute the score for the remaining fifteen manuscripts from *O* to *S*, each score indicating that

manuscript's relative affinity with *F*. In other words, the higher the score, the more (or more important) variants shared overall and therefore the greater the presumed affinity.

The main pitfall of this method is its apparent (and specious) precision. There is, in fact, no demonstrable reason to suppose that a phrase-omission is exactly, or even approximately, nine times as significant as a word-transformation. Such multipliers indicate nothing more than *relative* significance among variant-types. The final score should therefore be interpreted as a rough gauge, not a precise measure, of how closely related each manuscript is to *F*. Furthermore, if, as is probable, any of the sixteen manuscripts involved was produced according to *pecia*, whatever conclusions we may draw on the basis of such a statistical analysis will be tentative at best.¹¹

Bearing these points in mind, what are we to make of Table 1? First and most obvious is that *P1*, *V2*, and *Va* outstrip all the other manuscripts by a wide margin. Presumably, then, they have a significantly greater affinity with *F* than any of the other manuscripts. On that basis, they, along with *F*, can be taken to form a distinct family, which we will call Family I. Second, although they lag behind *P1*, *V2*, and *Va* in their overall scores, *L2* and *S* nonetheless show a markedly greater affinity for *F* than do the ten remaining manuscripts. We should therefore include *L2* and *S* within the *P1-V2-Va-F* family group, but not as core members.

TABLE 2

F	154	P1	1689	Va	1261	V2	2038
O	581	O	582	O	441	O	464
E	185	E	374	E	274	E	593
L1	207	L1	335	L1	401	L1	687
L2	<u>967</u>	L2	<u>1095</u>	L2	<u>1049</u>	L2	<u>851</u>
L3	130	L3	169	L3	191	L3	319
C1	202	C1	179	C1	226	C1	276
C2	163	C2	265	C2	281	C2	394
P1	<u>2263</u>	P2	330	P1	<u>2440</u>	P1	<u>1809</u>
P2	222	M	376	P2	386	P2	558
M	350	F	<u>2263</u>	M	338	M	425
V1	233	V1	384	F	<u>2159</u>	F	<u>1476</u>
V2	<u>1476</u>	V2	<u>1809</u>	V1	394	V1	527
Er	256	Er	261	V2	<u>2467</u>	Er	284
Va	<u>2159</u>	Va	<u>2440</u>	Er	332	Va	<u>2467</u>
S	<u>753</u>	S	<u>879</u>	S	<u>1028</u>	S	<u>946</u>

Following the same procedure for each manuscript in turn, then for each textual slice in turn, we add the totals from all fifteen slices to arrive at a grand total for each manuscript.¹² Comparing the same four manuscripts—i.e., *P1*, *V2*, *Va*, and *F*—on the basis of this comprehensive tabulation, we get the following results as listed in Table 2 on the previous page.

Not surprisingly, this final tabulation bears out the two main conclusions drawn from Table 1: namely, that *P1*, *V2*, *Va* and *F* form a core family-group and that *L2* and *S* belong to that group as somewhat distant members. However, within the core family-group, *P1* and *Va* show a greater affinity for *F* than does *V2*. *F*, *P1*, and *Va*, in short, form the inner core of that core family-group. Being most closely related among each other, then, these three manuscripts should be most closely related to the family-progenitor, *V2* being somewhat more distant, *L2* and *S* being most distant.

So far, then, we have isolated the three manuscripts that lie closest, as a group, to Family I's progenitor. To determine which particular manuscript within that group lies closest, however, we need to look at idiosyncratic variants. Briefly put, idiosyncratic variants provide some indication of the relative distance of a given manuscript from a common source. All things being equal, the more idiosyncratic variants a manuscript has, the farther it should lie from the common source.¹³ Applying this general rule to the case in point, we see from table 2 that *F* has a far lower score for idiosyncratic variants (154) than *P1* and *Va*. In fact, this extraordinary dearth of idiosyncratic variants suggests not only that *F* lies closest to Family I's progenitor, but that it lies very close indeed.¹⁴ By the same token, *Va* would seem to lie somewhat closer than *P1*, although in terms of shared variants, *P1* would seem to lie marginally closer to *F* (and thus to Family I's progenitor) than *Va*. *Va* also shows a greater affinity for *F*'s more distant relative, *V2*, than does *P1*. Overall, then, *P1* would seem to be slightly closer to the family progenitor than *Va*..

Using the same technique, I was able to break the ten remaining manuscripts into two groups: Family II, consisting of *C1*, *Er*, *O*, and *M* (entries 2, 3, 9, and 15), and Family III, consisting of *E*, *L3*, *C2*, *L1*, *P2*, and *V1* (entries 1, 4, 12, 13, 16, and 17). Family II is fairly cohesive, *Er* being perhaps somewhat closer to the family-progenitor than *O*, *M* lying farther from it but not by much, and *C1* lying farthest. Family III, on the other hand, is as diffuse as Family II is tightly knit. Its core comprises *E*, *P2*, and *L1*, with *E* lying closest to the family-progenitor. Considerably more distant from that progenitor than the three core-manu-

scripts are *V1* and *C2*, and more distant yet is *L3*. Meantime, although I have put it in Family II, *C1* shows an almost equivalent affinity with Family III so that it stands virtually equipoised between the two. *C1* therefore forms a bridge, albeit a relatively narrow one, between the Families II and III. Likewise, *S* forms a bridge of sorts between Family I and Family II.¹⁵

Having isolated these three families as well as having evaluated the relationships not only among their individual members, but also among the family-groups themselves, I was in a position to choose the appropriate manuscripts for collation in the critical text. Obviously, all three families had to be represented by appropriate exemplars. Logic dictates that these be the manuscripts most closely related to their respective family-progenitors. On that basis, *F*, *Er*, and *E* emerged as clear choices. But in this case *F* had to be rejected because it lacks so much of the relevant text: i.e., virtually all of book 1 and most of book 2. I therefore substituted *P1* for it.¹⁶ Along with these three core manuscripts, I included *S*, *L3*, and *C1* because of their status as bridges, *S* linking Families I and II, *C1* and *L3* linking Families II and III. Finally, having discovered *P3* too late to include it in my comparative analysis, I added it to the list in order to be on the safe side. Altogether, then, I selected seven manuscripts for collation: *P1*, *S*, *E*, *Er*, *C1*, *L3*, and *P3*. They are listed as “primary manuscripts” on pp. clv-clvii above.

This choice of manuscripts makes sense according to a comparison not only of detailed textual features but also of gross structural features. For one thing, *E*, *C1*, and *S* belong to the group of seven manuscripts that have integrated Ibn Mu‘ādh’s *De crepusculis* into the *De aspectibus*. For another, *P1* and *S* belong to the group of six manuscripts that contain both versions of the third chapter of book 3. As it turns out, this is a critical point, but more on that later. Finally, as is manifest from its description in entry 6 above, *P3* is clearly derivative from *E*. In short, all seven of the manuscripts chosen for collation are representative of the text at more than one level.

Afterthoughts on Manuscript-Selection: Having chosen these seven manuscripts for collation, I had certain expectations about how they would dovetail in the critical text. For the most part, these expectations were met. For example, *P1* and *S* not only bore out their family affiliation, but they proved to be even closer to one another than anticipated. Likewise, *E* and *P3* displayed the exceptionally close affinity expected of them. Somewhat less clear, but still discernible, was the expected affinity between *L3* and *C1*, both of them turning out (as anticipated) to be

more closely allied to each other than to their family representative *E*. As anticipated, both showed a relatively weak yet marked affinity for *Er*. Thus far there were no surprises.

Wholly unexpected, on the other hand, were the interpretive issues raised by the two versions of book 3, chapter 3, alluded to on p. clxi above. The first and more easily resolved of these issues is whether both versions are somehow integral to the text. Even the most superficial comparison makes it evident that they are not. On the contrary, they seem to parallel one another fairly closely—at least up to a point—so they are in essence redundant. The second issue is how to decide which of the two is extraneous. At first glance the answer seems straightforward enough. Both versions start out with a discussion of the threshold conditions of sight, and both continue in good order until paragraph 13. At that point, version 1 suddenly shifts to another subject.¹⁷ As it turns out, this shift involves a leap backward to the second half of chapter 2, which has been interpolated into paragraph 13 in abrupt and somewhat disordered fashion.¹⁸ Being thus incoherent, version 1 of the third chapter would seem to be a later addition, and a maladroit one at that. Presumably, then, we can dismiss it from consideration in establishing the critical text.

Were it not for A. I. Sabra's edition and English translation of the Arabic version of books 1-3, we might feel safe in leaping to this conclusion. But a comparison of his edition (in English translation) against the Latin text reveals several things that should restrain us. For one thing, such a comparison makes it clear that, from the beginning of book 1 to the very point where the textual shift occurs in version 1 of chapter 3, the Latin translation is remarkably faithful to its Arabic source. This changes dramatically with the textual shift. From that point on, the translation becomes so loose as to be little more than a paraphrase. Moreover, while fairly fluid to that point, the Latin style becomes somewhat awkward and confused thereafter. This change in style is accompanied by some significant changes in vocabulary as well.¹⁹

Taken as a whole, these changes suggest very strongly that at the point of the textual shift there was a sudden switch of translators, from an accomplished master to a relative tyro. If so, then the initial portion of version 1 up to the textual shift has to be the work of the master, whereas from that point on, to the very end of the third book in fact, the translation bears all the earmarks of his less polished successor. In all likelihood, then, version 1 of chapter 3 represents a pastiche, the first half being integral to the translation as originally conceived by translator 1, the second half representing an interpolation by his successor.

Also, while this addition constitutes a non sequitur vis-à-vis what precedes it, it dovetails perfectly with what follows it: namely, version 2 of chapter three, which is also the work of translator 2. Thus, the textual shift within version 1 of chapter 3 marks a clear divide between two coherent segments of the treatise: segment 1, which extends from the beginning of book 1 to the middle of chapter 3 in book 3 (translator 1); and segment 2, which extends from around the middle of chapter 2, book 3, to the end of that book (translator 2).

Why was version 1 created? When? Why was it created as it was; that is, why was translator 2's rendition of the second half of chapter 2 appended out of order to translator 1's rendition of the first half of chapter 3? How did it end up being included in the final text? These are all matters for speculation.²⁰ One thing seems incontestable, though: the first part of version 1 is an authentic continuation of, not a later addition to, the original text. This point is crucial, for if version 1 truly belongs to the original Latin text as it was disseminated for copying, it follows that any manuscript containing it falls within a textual tradition that harks directly back to that original. Accordingly, the six manuscripts comprising this tradition—i.e., *F*, *P1*, *Va*, *V2*, *S*, and *O*—should be more “authentic,” and thus more authoritative, than the other eleven. Furthermore, being closest to the family progenitor within this tradition, *F* should be the most authoritative of all.

The acid test of this conjecture is in the critical text itself. If the manuscripts within the *F-P1-Va-V2-S-O* tradition are indeed more authoritative than those outside it, then, as representatives of that tradition, *P1* and *S* should be more authoritative than the other five manuscripts chosen for collation. In practical terms, this means that, at those points in the text where the seven manuscripts disagree, *P1* and *S* should be more reliable than the rest in determining the correct reading. This in fact turned out to be the case. *P1* and *S* did prove to be more reliable, although not by the margin I anticipated.²¹ Nor did I anticipate that, given its relatively large distance from *F*, *S* would prove to be somewhat more reliable than *P1*. Still, I am confident enough in my overall reconstruction that, were I able to modify my selection of manuscripts in retrospect, the most I would do is substitute *O* for *Er* and drop *P3* as redundant.

The Critical Text: Even before I began editing the Latin text I was faced with two editorial decisions. The first was what to do about book 1. The problem is that, lacking all or most of this book, *C1* and *L3* could not be used in establishing its critical text. Since these two manuscripts

were selected as bridges rather than as core representatives, however, I felt relatively safe in leaving them unreplaced. Accordingly, the critical text of book 1 is based on the remaining five manuscripts alone: i.e., *P1*, *S*, *E*, *Er*, and *P3*.

The second and more difficult decision had to do with version 1 of chapter 3 in the third book. The problem here was twofold. On the one hand, I could simply include it in the critical text, but that would clearly disrupt the narrative flow. Furthermore, by my account it was never meant for inclusion in the final text anyway. On the other hand, I could discard it entirely, but that would be to ignore its crucial transitional status. In view of these problems, I took a middling course. I incorporated virtually all of the first portion of version 1 (consisting of translator 1's version of paragraphs 1-12 of chapter 3) into the critical text and remanded the second portion (consisting of translator 2's version of the second half of chapter 2) to Appendix 1 on pp. 642-647 below. To this latter textual segment I added the initial portion of version 2, consisting of translator 2's rendition of paragraphs 1-12 of chapter 3 (see pp. 646-651 below). Hence, as it is represented in my critical text, chapter 3 of the third book consists of two parts: paragraphs 1-12 from version 1, paragraphs 13-34 from version 2. Appendix 1, for its part, contains translator 2's version of the second half of chapter 2 as well as his version of paragraphs 1-12 of chapter 3.

The resulting critical text has two virtues. First, it reflects the full measure of translator 1's contribution, right up to paragraph 13 of chapter 3. In so doing, it also reflects the Arabic source as fully as possible. Second, since translator 2's contribution takes up seamlessly at that point, the narrative flow of the treatise is uninterrupted. The drawback is that, arranged in this way, the critical text does not, in all likelihood, reflect the Latin treatise as it was finally—and erroneously—compiled for fair copy and dissemination. Suffice to say, I think the virtues outweigh the drawback.

Since only two of the seven manuscripts chosen for collation contains version 1 of chapter 3 (i.e., translator 1's version of paragraphs 1-12 of chapter 3 coupled with translator 2's version of the second half of chapter 2), I decided for the sake of thoroughness to base version 1's critical text on the full complement of manuscripts containing it. Thus, the critical apparatus for the first twelve paragraphs of chapter 3 in the main text includes variants not only from *P1* and *S*, but also from *F*, *O*, *Va*, and *V2*, these latter four being listed under "secondary manuscripts" on pp. clvii-clix above. The same holds for the critical apparatus of the first section of the appendix. With the exception of book 1 and the first

twelve paragraphs of book 3, chapter 3, then, the main critical text is based upon the seven primary manuscripts chosen for collation.

Although I did not use it in establishing the critical text itself, I transcribed *R*, the 1572 edition by Friedrich Risner (entry 19, pp. clx-clxi above), in order to include its variants in the critical apparatus. In terms of textual details, *R* shows a marked affinity for the *E-P3* manuscript-group, an affinity that extends to its inclusion of Ibn Mu‘ādh’s *De crepusculis* and its concomitant exclusion of version 1 of chapter 3. *R*’s text therefore falls within the less definitive of the two basic manuscript-traditions discussed above. It also falls within the least definitive of the three family-traditions discussed above. In addition, *R* has emended the text so extensively that it should be regarded as a separate edition, not a mere version, of the *De aspectibus*.

Finally, as far as the Latin text is concerned, I have tried to keep it as true as possible to its medieval form. In accordance with that aim, I have followed the basic orthographic conventions of medieval Latin: the short *e* for the *ae* diphthong, the occasional substitution of *y* for *i* (e.g., *ymago* and *dyiameter*), the use of *m* rather than *n* in such agglomerates as *quodcumque*, and so forth. In the critical apparatus, on the other hand, if the variant is unique, I have followed the usage of the given manuscript, even if it departs from these conventions. This is particularly evident for *R*, whose orthography harks back to classical rather than medieval norms.

Summary of Results: At this point it might be useful to recapitulate the key points of the preceding textual analysis:

(1) Altogether, I had seventeen manuscripts available for collation. After an extensive comparative study of all seventeen, I was able to subdivide them into three basic groups: Family I consisting of *F*, *P1*, *Va*, *V2*, *L2*, and *S*; Family II consisting of *Er*, *C1*, *O*, and *M*; and Family III consisting of *E*, *P3*, *P2*, *L3*, *C2*, *L1*, and *V1*. On the basis of these groupings, I chose seven manuscripts as adequately representative for collation: *P1*, *S*, *E*, *Er*, *C1*, *L3*, and *P3*.

(2) After analyzing version 1 of chapter 3, book 3, I concluded that it reflects the work of two distinct translators. The initial portion, which consists of roughly the first thirteen paragraphs of chapter 3, is the work of translator 1, who was responsible for the Latin text of books 1 and 2 as currently extant. The second portion, which consists of roughly the second half of chapter 2, is the work of translator 2, who succeeded

translator 1 after his sudden abandonment of the project in the middle of chapter 3.

(3) Having concluded that the initial portion of version 1 is a genuine continuation of the original text, I also concluded that the six manuscripts containing it belong to a tradition that harks directly back to that original. These six consist of *P1* and *S*, which are listed above as primary manuscripts, and *F*, *O*, *Vat*, and *V2*, which are listed as secondary manuscripts. Being thus related to the original, these six manuscripts can be regarded as more authoritative than the remaining eleven. Accordingly, among the seven manuscripts chosen for collation in the critical text, *P1* and *S* should be the most reliable witnesses to the original text.

(4) In deciding how to incorporate version 1 into the critical text, I finally chose to include the first portion, to the end of paragraph 12 of chapter 3, in the main text of book 3 and to place the rest of version 1 in an appendix. In that same appendix I placed the equivalent portion of chapter 3 from version 2, which is translator 2's rendition of that chapter. Accordingly, the first 12 paragraphs of chapter 3 in the main text of book 3 hark back to the original translator (translator 1). The remainder of book 3 is the work of his successor (translator 2).

(5) Although the critical text is based, overall, on the seven primary manuscripts discussed above (*P1*, *S*, *E*, *Er*, *C1*, *L3*, and *P3*), there are two exceptions: book 1, whose critical text is based on five of those seven (*P1*, *S*, *E*, *Er*, and *P3*), and version 1 of chapter 3, whose text is based on the two primary manuscripts *P1* and *S* along with the four secondary manuscripts *F*, *O*, *Vat*, and *V2*.

The Critical Apparatus: My choice of manuscripts for collation was dictated by the desire not only to make the critical text as accurate as possible, but also to make the critical apparatus as representative as possible. To that end I cast a fairly broad net but one that was finely woven enough to trap virtually everything but orthographic variants. Even the relatively minor distinction between *igitur* and *ergo* is signaled in the critical apparatus. Such distinctions may seem overly nice, but what appear at first sight to be insignificant variants can turn out to be hallmarks within a particular manuscript tradition. With that in mind, I have chosen caution over convenience.

The conventions I have used in my critical apparatus are fairly standard. A given variant is referred first to a line-number within the text

and then to a particular keyword in that line. When the variant involves a phrase that extends beyond the initial line, it will be listed according to its first and last words with appropriate line-numbers given. For instance, "13 oculus . . . centrum (15)" designates the entire text running from "oculus" in line 13 to "centrum" in line 15. Substitutions are signaled by a colon between the keyword and its replacement, after which is written the siglum/sigla of the manuscript(s) containing that substitution. Thus, "3 quando: si EP3" means that, instead of "quando" in line 3, *E* and *P3* have "si." If the keyword is one of several identical words in the same line, its relative position is signaled by a superscript number. For example, "68 et³" designates the third "et" in line 68. When several variants in a given line are referenced to the same keyword, they are separated by semicolons. Hence, "54 inveniet: invenit *Er*; inveniret EP3" means that "inveniet" in line 54 has been changed to "invenit" in *Er* and to "inveniret" in *E* and *P3*. Variants within a given line that are not referenced to the same keyword are separated by a slash mark (/). Thus, "12 ipsius: illius *E*/auferat: convertat *R*" means that in line 12 *E* has substituted "illius" for "ipsius," and *R* has substituted "convertat" for "auferat." Doubtful or undecipherable readings are signaled by a question mark (?). Following is a list of abbreviations used in the critical apparatus:

- a. m.* *alia manu* ("in another hand"; i.e., by a scribe other than the original one): see example for *add.* below.

- add.* *addidit* ("has added"): **example** = "243 *post et add. tamen a. m. EP3*" means that after "et" in line 243, *E* and *P3* have added "tamen" in another hand.

- alter.* *alteravit* ("has changed"): **example 1** = "34 *corporis alter. in corporialis Er*" means that "corporis" in line 34 has been changed to "corporialis" in *Er*; **example 2** = "34 *corporis alter. ex corporalis in corporeitatis S*" means that instead of "corporis" in line 34, *S* had "corporalis," which was then changed to "corporeitatis."

- corr.* *correxuit* ("has corrected"): **example 1** = "34 *corporis corr. ex corporialis C1*" means that "corporis" in line 34 has been corrected from "corporialis" in *C1*; **example 2** = "34 *corporis alter. in corporialis deinde corr. ex corporalis a. m. L3*" means that "corporis" in line 34 was changed to "corporialis" by the original scribe and then corrected back to "corporis" by another scribe in *L3*.

- inter.* *interposuit* ("has made an interlinear insertion"): **example** = "26 *post et inter. iam L3*" means that after "et" in line 26 "iam" was inserted above, between lines 25 and 26, in L3.
- mg.* *in margine* ("in the margin"): **example** = "56 *post tamen add. quod mg. a. m. E*" means that after "tamen" in line 56 "quod" was added as a marginal insertion by another hand in E.
- om.* *omisit* ("has omitted"): **example** = "23 *tamen om. EP3*" means that "tamen" in line 23 is missing in E and P3.
- rep.* *repetevit* ("has repeated"): **example** = "74 *paulatim rep. Er*" means that "paulatim" in line 74 has been repeated in Er.
- scr. et del.* *scripsit et deleuit* ("has written and deleted"): **example** = "44 *post quod scr. et del. plurimum C1*" means that after "quod" in line 44 "plurimum" was deleted in C1.
- transp.* *transposuit* ("has transposed"): **example** = "97 *ille color transp. R*" means that, instead of "ille color" in line 97, R has "color ille."

Finally, there are cases in which variants shared by several manuscripts have subvariants. In these cases, the subvariants are listed at the end of the main variant within parentheses. Thus, for example, "57 *post et add. si revertatur ad umbram apparebit color ille super ipsum et EErP3* (color ille *transp. Er*)" means that after "et" in line 57 E, Er, and P3 have added the phrase "si . . . ipsum et" but that, within this added phrase, Er has transposed "color ille" to "ille color."

The Translation: As a translator, I am mindful of St. Paul's admonition that the letter kills. An overly literal translation can indeed kill a text. Worse, it can bludgeon it senseless in the process. On the other hand, while it may be more graceful, an overly liberal translation can be just as invidious. Bearing that in mind, I have tried to navigate between these extremes, getting the intent of the text across as clearly as possible without straying too far from the actual Latin. Suffice to say, this is often simpler in theory than it is in fact.

For one thing, there are cases, particularly in the second half of book 3, where the critical Latin text makes little or no sense as it stands. The temptation in such cases is to bend the English—if not the Latin—to the apparent (i.e., "correct") rather than the literal (i.e., "incorrect") intent

of the Latin. I have tried to avoid that temptation. After all, the critical text is supposed to be a faithful replica of the original, warts and all. To excise those warts from the English translation would thus be, in a sense, to Bowdlerize the text.

For another thing, certain key terms lose intended connotations while others gain unintended ones when they are translated literally. Take, for example, *comprehensio*. Rendered as “comprehension” or “understanding,” this term would convey a sense of profound intellectual awareness that is quite clearly unmeant in the Latin text. “Perception” conveys the intent far better. Likewise, as used in the Latin text, the term *sillogismus* would be improperly rendered as “syllogism,” because that denotes a particular, structured form of logical argument. In the text itself *sillogismus* denotes the act of drawing perceptual, and thus subrational, conclusions: e.g., “there is a window between me and what I see through it.” To convey this looser sense, I have translated the term throughout as “deduction.”

As far as format is concerned, I have tried to key my Latin and English texts to Sabra’s Arabic original insofar as possible. To that end, I have broken my text into paragraphs according to his version and have numbered each paragraph according to their appropriate placement in his text. Thus, the very first paragraph of chapter 1 in the Latin version is numbered 4.1 to reflect that it is the first paragraph of chapter 4 in the Arabic version; in fact, the numbering of paragraphs on this basis extends through chapter 5 of the Latin version, the last paragraph in that chapter being 4.28. In some cases, particularly in the second half of book 3, the two texts are so divergent that such pinpointing is extremely difficult. I have nonetheless done my best to keep the texts as parallel as possible within reasonable limits.

There are, in addition, some clear topical subdivisions in the text of the *De aspectibus*. In the third chapter of book 2, for instance, Alhacen deals in order with the twenty-two “visible intentions” that are perceived in the process of sight: i.e., light, color, distance, spatial disposition, corporeity, shape, size, discontinuity or separation, continuity, number, motion, rest, roughness, smoothness, transparency, opacity, shadow, darkness, beauty, ugliness, similarity, and difference. Although two of the manuscripts (*E* and *P3*) subdivide all of these topics physically, three (*Er*, *O*, and *M*) provide no physical subdivision at all. The rest of the manuscripts subdivide some of the topics, but in an apparently haphazard way (see Tables 2B and 8.3 in Appendix 2, pp. 655 and 663 below). As a result, I have decided to signal none of these subdivisions in the Latin text. In the English translation, on the other hand, I have sig-

naled all of them for the sake of easy reference. Likewise, in the seventh chapter of book 3, Alhacen deals in order with the eight conditions that can cause misperception. As with his discussion of the visible intention, so with his discussion of these conditions, the topical transitions are clear. Nonetheless, those transitions are not always demarcated by physical subdivisions in the manuscripts (see Tables 3B and 8.5 in Appendix 2, pp. 657 and 664 below). In this case, however, since the transitions are marked by an introductory summary, I have subdivided both the Latin text and English translation and rendered those introductory summaries in italics. In both cases, then, I have tried, insofar as possible, to honor the intended structure of the Latin original.

Then there is the matter of diagrams. While it is clear from the text that only one diagram was actually intended as an integral part of the treatise,²² many of the manuscripts provide supplementary diagrams that are intended to explain or illustrate points made in the text. The most copious supply of such diagrams is to be found in *E* and *P3*, the latter having clearly been copied from the former. I have included these diagrams at appropriate spots in my running commentary, keying them to where they actually fit in the text. I have used the figures from *P3*, the copy, rather than *E*, the original, because the former are more clearly rendered than the latter. A cross-listing of these diagrams for all the relevant manuscripts is provided in Appendix 4, p. 677 below.

My rationale for including these diagrams is twofold. First, I view them as variants; their inclusion or rejection in given manuscripts serves as another means, along with textual variants and intratextual organization, of segregating manuscripts into groups. Second, as glosses of a sort, they provide an interpretive guide to the text, serving either to mark points of particular interest or concern ("nota bene") or to elucidate what the scribe or commentator took to be knotty issues. I did not, on the other hand, include all the glosses because, given their number and variety, I felt that incorporating them would have been too time-consuming, and the results too unwieldy, to warrant the effort.

A few words, finally, about reference-aids. First, in order to make it easier for the interested reader to locate particular subjects in the text, I have provided a fairly detailed topical synopsis at the beginning of each book in the English translation. Each chapter of the relevant book is defined in terms of its general subject-matter (e.g., in the synopsis for book 1, the general subject-matter of chapter 6 is "The Physical Structure of the Eye"). Underneath each chapter-description is a listing of specific topics according to the paragraphs within which they are treated (e.g., under chapter 6 of book 1, the first listing reads "[5.1-5.3] Origin of

optic system in the brain; connection through hollow optic nerves.”).

Second, in an effort to make this edition as user-friendly as possible, I have included a Latin-English index, which provides a relatively complete concordance of Latin and English terms keyed to the critical text and the parallel translation. This index is complemented by an English-Latin glossary, which is meant to serve as a convenient cross-reference. These two indexes are followed by a general index, which is keyed primarily toward the introduction and commentary.

NOTES

¹Of the twenty-four items listed below, twenty-two are given by David Lindberg in his *Catalogue*, pp. 17-19. The two that have since been uncovered are listed as entries number 6 and 23, pp. clvii and clxi above. My thanks to Dr. Richard Lorch for alerting me to the existence of the first of these manuscripts.

²For further discussion, see A. Mark Smith, "The Latin Source of the Fourteenth Century Italian Translation of Alhacen's *De aspectibus* (Vat. Lat. 4595)," *Arabic Sciences and Philosophy* 11 (2001): 27-43. See also A. Mark Smith and Bernard R. Goldstein, "The Medieval Hebrew and Italian Versions of Ibn Mu'ādh's 'On Twilight and the Rising of Clouds,'" *Nuncius: Annali di storia della scienza*, 8 (1993): 613-643, esp. 628-629.

³See Vescovini, "Alhazen Vulgarisé."

⁴See "Introduction," p. xxi above, for a discussion of the proper rendering of Alhacen's name.

⁵For a detailed account of this treatise and its manuscript tradition, see A. M. Smith, "The Latin Version of Ibn Mu'ādh's Treatise 'On Twilight and the Rising of Clouds,'" *Arabic Sciences and Philosophy* 2 (1992): 83-132.

⁶See Appendix 2, pp. 653-665 below for details, esp. Tables 8.1-8.9 on pp. 662-665 below.

⁷In fact, by the time I became aware of *P3*'s existence I was virtually ready to begin editing; see p. clxii above.

⁸*Autolycus de Pithane: Histoire du texte suivie de l'édition critique des Traités de la sphère en mouvement et des levers et couchers*. Recueil de travaux d'histoire et de philologie de l'Université de Louvain 3, 37 (Louvain, 1950).

⁹The overarching assumption here is that medieval scribes felt no license whatever to depart from the text they were copying.

¹⁰The actual slices are as follows: 1r-4v, 11r-14r, 2v-25r, 34r-37r, 40v-42v, 44r-49v, 52r-53r, 55v-58r, 63r-64r, 69r-70r, 74r-76r, 81v-82v, 87r-90r, 96r-97v, 104v-105v.

¹¹For a discussion of the problems posed by manuscript-production according to *pecia*, see Smith, *Witelonis Perspectivae liber quintus*, p. 77n; see also Unguru, *Witelonis Perspectiva liber secundus et liber tertius*, p. 34. For a more recent discussion of this subject, see Mary A. Rouse and Richard H. Rouse, *Authentic Witness: Approaches to Medieval Texts and Manuscripts* (Notre Dame, Ind.: University of Notre Dame Press, 1991), esp. pp. 259-338; see also pp. 339-408 for a discussion of how manuscript-collections developed into "libraries" during the later Middle Ages.

¹²The final tabulations for all sixteen manuscripts are given in Tables 2-17 of

Appendix 3, pp. 669-676 below.

¹³If we assume a relatively consistent level of accuracy among medieval scribes, then the number of idiosyncratic variants can be telling. Assume, for instance, that scribe A copies a treatise from manuscript V. In the process of creating his own manuscript-version, W, scribe A will make errors, mistranscribing words, adding or omitting phrases, and so forth. If W subsequently becomes the basis for scribe B's copy, X, of the treatise, then scribe B will reproduce most of the errors imported by scribe A while adding some of his own. But some of his errors will involve mistranscriptions of errors imported into W by scribe A. Improperly reproduced, the original errors will thus be left untouched in W. They will therefore constitute idiosyncratic variants. The same holds for copy Y made by scribe C from W, as well as for copy Z made by scribe D from Y. Now, if all four versions happen to survive so that we can submit them to the comparative analysis described above, we should get the following results. Z, the last manuscript in line, will have the greatest number of idiosyncratic variants, because none of the errors imported by scribe D will have had a chance to get copied and thus become shared. The progenitor, V, on the other hand, will have the fewest, because the lion's share of its idiosyncratic variants will have become shared variants in the process of transmission through W, X, Y, and Z. Throughout this process of transmission, then, there will be a continual accretion of idiosyncratic variants through the steady and inexorable compounding of scribal errors. Furthermore, even if the intermediate versions between V and Z were missing, their presence would be indicated by the relatively high number of idiosyncratic variants contained by Z. All of this is of course contingent on a relatively consistent level of accuracy among the scribes. An inordinately sloppy scribe can skew the results badly, particularly if his version is the last in the series.

¹⁴Just to put things into perspective, C2 (which is not a member of F's family) has a score of just under 6,100 for idiosyncratic variants. This number is so high that it most likely indicates not the relative distance of C2 from its family progenitor but the ineptitude of its scribe.

¹⁵See Appendix 3, pp. 667-676 below, for the composite numerical data upon which these conclusions are based.

¹⁶In essence, I chose P1 over Va because of Va's greater affinity for V2.

¹⁷This textual shift occurs as follows, starting with paragraph 13:

Et etiam visus, cum fuerit lesus, aut accidet ei aliquod accidens transmutans . . . / . . . et ex hoc quodcumque sumatur viso punctum K. Non per axem comprehendatur, sed per radium videtur axi communi fixo propinquius loco vero (Moreover, when the eye is injured, or something happens to it that changes. . . / . . . and on this visible object let some point K be taken. It should not be perceived along the axis, but it is seen by a ray nearer to the actual location [of the object] than the fixed common axis. . . .).

¹⁸See Appendix 1, p. 642-651 below, for the full interpolation.

¹⁹For instance, whereas translator 1 uses the term *remotio* to denote "distance" in a generic sense, translator 2 uses *longitudo*.

²⁰I offer the following tentative reconstruction: having reached the middle of paragraph 13 in chapter 3, translator 1 abruptly abandoned the project (sudden death?), leaving it to his apprentice, translator 2, to finish the job. Unused to working independently, translator 2 decided to practice by translating the second half of chapter 2 and checking the results against the text already established by his master. Finally satisfied that he was as prepared as he could hope to be, translator 2 began his own work in earnest somewhere in the course of chapter 3. For the sake of textual continuity, he decided at that point to ignore translator 1's partial text of chapter 3 and place his own version of chapter 3 (i.e., version 2) at the end of chapter 2 in the original text. This decision made, translator 2 gathered up translator 1's incomplete text of chapter 3, added his own practice-translation from chapter 2, and set the resulting sheaf of folios (i.e., version 1) aside to be recycled or discarded later. However, when the Latin text of the *De aspectibus* was finally compiled for fair copy, that sheaf of folios was inadvertently inserted into book 3, right at the end of chapter 2 where it seemed to belong.

²¹There is an obvious potential circularity in the claim that *P1* and *S* confirmed my expectations in the first place. The actual confirmation, however, was based on the fact that more often than not where the texts diverged—particularly in those cases where meaning changed—*P1*'s and *S*'s readings were most consistent in making sense.

²²This is clear from the text itself, where there is reference to only one figure by letter-designations (i.e., by lettered points, lines, and angles); see III, 2.27-44, pp. 573-577 below. According to Sabra's edition, moreover, there is only the one figure.

ALHACEN'S
DE ASPECTIBUS
LATIN TEXT

[PRIMUS TRACTATUS]

[CAPITULUM 1]

[4.1] Invenimus visum quando inspexerit luces valde fortes fortiter dolebit ex eis et habebit nocumentum, aspiciens enim quando aspexerit corpus solis non poterit bene aspicere ipsum, quoniam visus eius dolebit propter eius lucem. Et similiter quando inspexerit speculum tersum super quod ascendebat splendor solis et fuerit visus eius in loco ad quem reflectitur lux ab illo speculo, dolebit etiam propter lumen reflexum perveniens ad suum visum a speculo, et non poterit aperire oculum ad inspiciendum illud lumen.

[4.2] Et invenimus etiam quando aspiciens intuetur corpus mundum album super quod ascendebat lux solis et moretur in aspectu ipsius, deinde auferat visum suum ab eo ad locum obscurum debilis lucis, quod fere non poterit comprehendere res visibiles illius loci comprehensione vera, et inveniet coopertorium quasi inter ipsum et ipsas. Deinde paulatim discooperietur, et revertetur visus in suam dispositionem. Et iterum quando inspiciens inspexerit fortem ignem et fuerit intuens ipsum et moretur in aspiciendo longo tempore, deinde declinet visum suum ad locum obscurum debilis lucis, et inveniet etiam idem in visu suo.

[4.3] Et iterum invenimus quando inspiciens inspexerit corpus mundum album super quod oriebatur lux diei et fuerit illa

1 visum: quod visus R 3 quando: si EP3 4 eius²: ipsius R 5 tersum: rursum Er
6 splendor: lux EP3R; speculum P1 7 etiam: iterum R
8 perveniens *corr. ex proveniens a. m. E*; *corr. ex peveniens a. m. S*/suum visum *transp. P1* /non *inter. a. m. E*/poterit *corr. ex potuit a. m. P3* 9 illud lumen *transp. R*
10 etiam: iterum R 11 moretur *corr. ex moritur S* 12 ipsius: illius E/ auferat: convertat R/suum *om. P3* 13 poterit: potuit E; *alter. ex potui in potuit a. m. P3*
14 coopertorium (15) *corr. ex cooperatorium P3* 15 ipsum: visum P1/post paulatim *add. et paulatim EP3 (mg. a. m. E)* 16 quando (17): quoniam Er 17 post inspexerit *scr. et del. quoniam Er/fortem ignem transp. EEP3R/intuens: intuitus R/ ipsum om. Er* 19 et: etiam Er; *om. R/etiam: iterum R* 21 iterum invenimus *transp. P3*

lux fortis, quamvis non sit lux solis, et moretur in aspectu diu,
 deinde auferat visum suum ad locum obscurum, inveniet for-
 25 mam illius lucis in loco obscuro illo, et inveniet cum hoc figur-
 am eius. Deinde si clauserit visum et fuerit intuens secundum
 horam, inveniet in oculo suo formam illius lucis. Deinde aufer-
 etur hoc, et revertetur visus in suam dispositionem. Et simili-
 ter erit dispositio visus quando inspexerit corpus super quod
 30 oriebatur lux solis.

[4.4] Et similiter si inspexerit corpus clare album super
 quod oriebatur lux ignis, quando lux ignis fuerit fortis, et more-
 tur in aspiciendo ipsum, deinde recesserit ad locum obscurum,
 inveniet in eo etiam idem hoc in suo visu. Et similiter quando
 35 aspiciens fuerit in domo in qua fuerit foramen amplum disco-
 opertum ad celum et aspexerit ex illo loco celum in luce diei et
 moretur in aspiciendo ipsum, deinde revertatur visus eius ad
 locum obscurum in domo, inveniet formam lucis quam compre-
 hendebat ex foramine cum figura foraminis in loco obscuro. Et
 40 si clauserit oculum suum, inveniet etiam in eo formam illam.

[4.5] Omnia ergo ista significant quod lux operetur in vi-
 sum aliquam operationem.

[4.6] Et invenimus etiam inspicientem quando inspexerit
 viridarium multe spissitudinis herbarum super quod oriebatur
 45 lux solis et moretur in aspiciendo ipsum, deinde auferat visum
 suum ad locum obscurum, inveniet in illo loco obscuro formam
 illius lucis coloratam a virore illarum herbarum. Deinde si as-
 pexerit in ista dispositione visibilia alba et fuerint illa visibilia
 in umbra et loco debilis lucis, inveniet colores illos admixtos
 50 cum virore. Et si clauserit oculum suum etiam et fuerit intuens
 in eo, inveniet in suo oculo formam lucis et formam viroris.
 Deinde discooperietur illud et auferetur. Et similiter si aspex-
 erit corpus coloratum colore lazuleo vel rubeo vel alio colore

23 quamvis: quam *Er/lux² alter. in lumen a. m. EP3* 24 auferat: convertat *R/*
 inveniet: invenit *Er* 25 illius lucis *transp. EErP3/obscurum om. EP3R* 26 post
 visum *add. et fuerit visum EP3/et . . . horam (27) om. R* 27 inveniet *corr. ex in-*
 venient *P3/oculo: ipso R/suo om. R* 28 post revertetur *add. oculum vel E; add.*
oculus et P3/visus: oculum R 29 ante corpus *scr. et. del. visus P3* 31 si: quan-
 do *R* 32 quando lux ignis *om. P1* 34 in eo etiam: etiam in eo *EP3R/etiam: iter-*
um R/hoc in suo rep. P1/quando rep. Er 35 fuerit²: fuit *P1* 36 et¹ *corr. ex ex a.*
m. E/ex: in Er 37 visus *om. P1* 40 etiam: iterum *R* 43 etiam . . . quan-
 do: iterum quod quando aspiciens *R* 45 auferat: convertat *R/visum su-*
 um (46) *transp. EP3R* 47 illius lucis *om. EP3R/lucis om. P1; inter. S/herbar-*
um: herbas Er 48 ista: illa *Er* 50 etiam: iterum *R/et² . . . eo (51) om. R*
 51 suo oculo: ipso *R* 52 discooperietur *corr. ex discooperiatur a. m. E* 53 co-
 lore¹ *corr. ex colorem P3/ lazuleo: caeruleo R; corr. ex laleo E*

55 forti scintillante super quod oriebatur lux solis et moretur in
aspiciendo ipsum, deinde auferat visum suum ad visibilia alba
in loco debilis lucis, inveniet colores eorum admixtos cum illo
colore.

[4.7] Ista ergo significant quod colores illuminati operentur
in visum.

[CAPITULUM 2]

[4.8] Et etiam videmus stellas in nocte, et non videmus ip-
sas in luce diei; et nulla differentia est inter duo tempora nisi
quod aer medians inter visum nostrum et celum est in die illu-
minatus et in nocte obscurus. Dum ergo aer fuerit obscurus,
5 nos videmus stellas; cum autem illuminatus fuerit aer medius
inter visum nostrum et stellas, latebunt nos stelle.

[4.9] Et similiter si aspiciens fuerit de nocte aspiciens in
loco luminoso lumine ignis, et fuerit lumen ignis extensum su-
per terram, et fuerint in illo loco visibilia subtilia aut visibilia in
10 quibus sunt res subtiles, et fuerint in aliqua umbra sed non for-
ti, et non fuerit ignis medius inter visum et illa visibilia, et fue-
rit tunc inspiciens comprehendens illa visibilia et res subtiles
que sunt in eis, deinde moveatur a suo loco donec sit ignis me-
dius inter visum suum et illa visibilia. Tunc illa visibilia late-
15 bunt ipsum, si fuerint subtilia, vel subtilia que in eis sunt, et
fere non comprehendet ipsa cum ignis fuerit medius inter vi-
sum suum et ipsa visibilia. Et si cooperiatur ignis a visu suo,
comprehendet statim illa visibilia que latebant ipsum; et si
20 auferatur coopertorium inter visum suum et ignem, latebunt
ipsum iterum illa visibilia.

[4.10] Iste ergo dispositiones significant quod luces fortes

54 scintillante *corr. ex* sintillante *E* 56 in loco *rep. P1*/eorum: illos *ER*; *om. P3*/
illo *corr. ex* illos *P3* 58 ergo: igitur *Er*/illuminati: luminati *P1S*; *corr. ex* illumi-
na *a. m. P3* 1 etiam: iterum *R/post* etiam *add. quod EP3* 2 differentia est *transp.*
R/duo om. R 4 obscurus¹ *corr. ex* obscuris *S/ante dum scr. et del. nos videmus stellas*
P3/dum: cum R/post obscurus² add. et S 5 aer *inter. a. m. E* 6 post stellas
scr. et del. p P1 7 fuerit *de om. R/aspiciens²: aspexerit R* 9 subtilia aut visibilia
om. P1 10 subtiles: similes *P3* 11 visum . . . visibilia: illa visibilia et visum
EP3R/fuerit (12): comprehenderit R; corr. ex fuerint P3 12 inspiciens: aspiciens
EP3R/comprehendens om. R/post visibilia rep. et³ (11) . . . visibilia (12) Er (om. compre-
hendens) 13 deinde: demum *ErP1S* 14 visum . . . visibilia¹: illa visibilia et
suum visum *EP3R/suum om. P1/tunc . . . visibilia om. P1* 16 fere *om. S/fuerit:*
fuit P1 18 illa visibilia *transp. R* 19 visum suum *transp. Er* 20 illa:
ipsa Er 21 post significant *scr. et del. que S/quod om. S*

orientes super visum et super aerem inter oculum et rem visam prohibent visum a comprehensione quorundam visibilium quorum lucēs sunt debiles.

- 25 [4.11] Et iterum quando aspiciens aspexerit corpus tersum et fuerint in illo corpore sculpture subtiles et non fuerint ille sculpture diversorum colorum a colore corporis sed fuerint ex colore illius corporis, et fuerit aspiciens in loco temperate lucis et fuerit ille locus oppositus soli vel quibusdam parietibus illu-
30 minatis lumine forti, deinde oppositum fuerit celo aut parieti illuminato, reflectetur ab eo aliqua lux ad visum, et inveniet aspiciens lucem apparentem in superficie corporis et in loco a quo reflectitur lux fortio-rem et magis scintillantem. Et in ista dispositione, si inspiciens fuerit intuens illud corpus tersum,
35 non videbit in eo aliquam sculpturam ex sculpturis que sunt in loco lucis fortis scintillantis illius corporis. Deinde si inspiciens inclinaverit illud corpus ab illo loco ita quod reflexio fiat ad alium locum extra locum visus sui, et fuerit cum hoc super corpus illud lux temperata, tunc inspiciens comprehendet
40 sculpturas que sunt in eo quas non comprehendebat in reflexione lucis a corpore ad suum visum.

- [4.12] Et similiter quando lux reflectetur a pagina tersa in qua sunt sculpture subtiles ad visum, non distinguet visus illas sculpturas nec verificabit donec sit lux reflexa ad visum ab illa
45 pagina. Et si declinetur superficies pagine ita quod situs eius mutetur et non reflectatur lux ab ea ad visum, comprehendet tunc visus illas sculpturas et distinguet.

- [4.13] Et iterum quando ignis debilis fuerit in lumine debili, apparebit et comprehendetur a visu, et cum fuerit in lumine
50 solis, apparebit corpus in quo est densum coloratum colore scintillante forti.

22 orientes: oriente Er 23 visum mg. E/post a scr. et del. c S/quorundam: quada-
dam ErP15; quarundam P3 25 tersum: torsum Er 27 ante colorum scr. et
del. corporum P1/colorum mg. E/colore . . . sed: corpore coloris si P1/sed . . . cor-
poris (28) om. EErP3R 29 et . . . forti (30) om. R 30 post fuerit add. corpus illud
R/celo: soli R 31 post illuminato add. lumine forti R 32 corporis om. P1/post
in² add. hoc P1 33 ista: illa Er 34 intuens: intuitus R 36 post fortis
add. et R/illius corporis om. R/deinde: de P1 37 inclinaverit: declinaverit R/il-
lud corpus transp. P3/quod: ut R 38 cum hoc: praeterea R 39 temperata:
temporata S 40 ante non add. prius EP3R 42 ante a scr. et del. revertetur S/
post pagina add. vel tabula a. m. S 43 qua om. P3/post sunt scr. et del. soli E
44 post sculpturas scr. et del. ita E/ nec: que E; donec P1/verificabit: vivificabit P3/post
lux add. non Er; scr. et del. um S 45 ita quod: itaque Er/quod: ut R 46 reflec-
tatur: reflectetur Er/lux ab ea: ab ea lux R/ea om. P3 47 post tunc scr. et del. lux E/
sculpturas om. P1

[4.14] Et si positum fuerit prope illud corpus corpus album
clare albedinis et fuerit illud corpus in umbra et in luce debili,
apparebit super ipsum color corporis, sicut narravimus super-
55 ius. Deinde si appropinquet illud corpus album donec sit in
lumine solis, latebit ille color qui est super eum, et si revertatur
ad umbram, apparebit ille color fulgens super ipsum. Et apud
suum esse in luce forti et apud latitationem corporis quod est
super ipsum, si obumbretur corpus corpore denso et sit in suo
60 loco donec debilitetur lux que est super ipsum, apparebit color
qui est super ipsum. Et si auferatur corpus obumbrans donec
vigorescat lux super corpus album, latebit color qui est super
ipsum.

[4.15] Et similiter quando appropinquaverimus corpus di-
65 afonum coloratum colore scintillante igni vehementer forti et
appropinquaverimus umbre illius corporis pannum album,
apparebit color illius corporis diafoni super illum pannum,
sicut narravimus prius. Deinde si appropinquaverimus illi
panno alium ignem ita quod lux eius oriatur super illum pan-
70 num, latebit ille color qui apparebat super pannum, et non
apparebit nisi albedo panni tantum. Et si auferamus illum
ignem secundus, apparebit color super pannum.

[4.16] Et etiam quedam animalia marina habent conchas et
telas, et cum fuerint in loco obscuro in quo non est lux, appar-
75 ebunt ille conche quasi ignis; et si inspiciens inspexerit eas in
luce diei vel in luce ignis, comprehendet eas et non videbit in
eis lumen vel aliquem ignem. Et similiter quando animal quod
dicitur noctiluca volat de nocte, apparet quasi lampas, et cum
aspiciens inspexerit eum in luce diei vel in luce ignis, apparebit

52 *post et add. tamen EP3; add. tum R/positum om. EP3R/ prope: proprie P1/post corpus¹ add. aliquod R* 53 *illud corpus transp. EP3R/ in² om. EP1P3R* 54 *post corporis add. illius EP3R* 55 *si corr. ex sic S/appropinquet: propinquas Er; moveatur R* 56 *ante ille add. iam EErP3R/super eum: in eo R/revertatur: reducat R* 57 *ille color transp. R/fulgens: refulgens Er/post fulgens add. qui est EErP3R/super: in R/ipsum: eum EP3; ipso R/post et add. si revertatur ad umbram apparebit color ille super ipsum et EErP3 (color ille transp. Er); add. apparebit color illo R/apud: super R* 58 *suum esse: ipsum EP3R/post corporis add. vel coloris EP3/quod: qui R* 59 *post ipsum add. et P1S/corpus om. EP3R/sit: si maneat R/post in scr. et del. corpore P3/suo loco (60) transp. P3* 64 *appropinquaverimus: appropinquavimus EP3; admoverimus R* 66 *appropinquaverimus: admoverimus R* 67 *color om. Er/diafoni: diafonum Er/illum: illam P3* 68 *appropinquaverimus: admoverimus R* 69 *alium: album Er/ita: in Er/quod: ut R* 70 *qui inter. S* 73 *post et¹ add. si EP3 (scr. et del. E)/etiam: iterum R* 74 *telas: testas R/post et scr. et del. cum P3/apparebunt (75): apparebit Er* 75 *si: cum P1/eas: illas EP3R* 77 *vel . . . ignem om. P1S/quando om. P3/quod inter. P1* 79 *aspiciens inspexerit: aspexerit P1S/eum: illud R; corr. ex id a. m. EP3*

80 animal sine igne.

[4.17] Significant ergo omnes iste dispositiones quas declaravimus quod luces fortes visibilium aliquando occultant res que sunt in quibusdam visibilibus et quod luces debiles aliquando manifestant quasam res que sunt in quibusdam visibilibus.

[CAPITULUM 3]

[4.18] Et iterum visui multotiens latent multe res que sunt invisibiles ex sculpturis subtilibus et scripturis subtilibus quando fuerint in lucibus debilibus vel in locis obscuris, et cum extrahuntur ad loca luminosa fortis luminis vel ponuntur in luce solis, apparebunt res que sunt in eis que latebant in locis obscuris et in lucibus debilibus. Et similiter sculpture subtiles, nequit visus comprehendere earum comprehensiones in locis obscuris et in lucibus debilibus; et cum extrahuntur ad luces fortes, comprehenduntur a visu.

[4.19] Significatur ergo per hanc dispositionem quod luces fortes manifestant multas res visibilium et quod luces debiles occultant multas res visibiles.

[CAPITULUM 4]

[4.20] Et iterum invenimus multa corpora densa colorata coloribus scintillantibus, sicut lazuleis, et vinosis, et celestibus, quando fuerint in locis obscuris et lucibus debilibus, apparebunt colores eorum turbidi. Et cum fuerint in luce forti apparebunt colores eorum scintillantes clari, et quanto augmentabi-

82 visibilium: visibili P3 84 quibusdam *corr. ex* quibus S 1 visui: visum R/
 multe: quedam EP3R 2 invisibiles: visibiles S/*ante ex scr. et del.* latent P1/*ex inter.*
 S/subtilibus¹ om. R 3 in¹ . . . obscuris: in locis obscuris vel in . . . debilibus EP3R/
 cum extrahuntur (4): si extrahantur R 5 locis *corr. ex* lucis P3/obscuris (6) om. EP3R
 6 et¹ om. Er/in om. R/sculpture subtiles: sculpturarum subtilium comprehensio-
 nes R 7 earum comprehensiones om. R 8 in om. R 10 significatur: signa
 EErP1P3S/ *post* hanc *add.* disputationem vel EP3/dispositionem: disputationem P1/
ante quod *add.* vel disputationem Er 11 *ante* multas *add.* quasdam EP3/multas: vel
 multas *inter.* EP3 (*mg. a. m. E*) 12 *ante* res *add.* res visibilium et quod luces debiles
 occultant P1 1 multa . . . colorata: quod colores corporum densorum coloratorum
 R/*ante* densa *scr. et del.* colorata P1/colorata: colora P1 2 et¹ om. R 3 *post*
 quando *add.* ipsa R/apparebunt (4): apparent R; *corr. ex* apparerebunt S 4 colores
 eorum *transp.* EP3; om. R/apparebunt (5): apparent R 5 *ante* clari *add.* et R/*post*
 quanto *add.* magis R

tur lux super ipsum tanto augmentabitur super ipsum scintillatio coloris et claritas. Et cum fuerit aliquod istorum corporum in loco obscuro et non fuerit in eis nisi lux parva valde, illud corpus apparebit obscurum, et non distinguet visus colorem eius, et videbitur quasi niger. Et cum extrahitur ad loca luminosa lumine forti, apparebit color eius et distinguetur a visu.

[4.21] Et invenimus etiam corpora turbidi coloris quod, quando lux oritur super ipsa fortis, quod colores eorum clarescunt; et invenimus etiam quod, quando lux fortis oritur super corpora densa alba, augmentabuntur in albedine et scintillatione apud sensum.

[4.22] Et etiam invenimus corpora diafona colorata coloribus fortibus, sicut vina fortia fortis ruboris que sunt in vasis diafonis, quando fuerint in locis obscuris et lucibus debilibus, apparebunt nigra et obscura et quasi non diafona. Et cum fuerint in lucibus fortibus et oriatur super ipsa lux solis, clarescent colores eorum, et apparebit in eis diafonitas.

[4.23] Et similiter lapides diafoni colorati, quando fuerint in locis obscuris, apparebunt colores eorum turbidi et obscuri; et cum super ipsos oritur lux fortis vel ponuntur in oppositione lucis ita quod lux pertranseat ipsos, apparebunt colores eorum clari, et apparebit in eis diafonitas propter penetrationem lucis.

[4.24] Et etiam quando corpora diafona colorata ponuntur in oppositione lucis et fuerit positum ex parte contraria parti lucis corpus album, sicut diximus superius, si lux fuerit fortis, apparebit forma illius coloris in umbra eius super corpus album oppositum ei. Et si lux oriens super ipsum fuerit debilis,

6 ipsum^{1,2}: ipsa R/tanto . . . ipsum om. P1/post tanto add. magis R/scintillatio (7): scintillant R 7 et¹ om. R/cum: si R/post aliquod scr. et del. ipsorum S 8 eis: eo R/post eis scr. et del. in eis P1 9 illud . . . apparebit: apparebit . . . illud R/visus corr. ex usus E 13 etiam . . . quod: iterum quod coloris corporum ferrei coloris R 14 post lux scr. et del. fortis S/quod . . . eorum om. R/colores . . . clarescunt (15): clarescunt . . . eorum EP3 15 ante et scr. et del. et invenimus etiam quod quando corpora turbidi coloris quod quando lux oritur super ipsa fortis quod clarescunt colores eorum E/quando om. P3 16 augmentabuntur: augmentantur R/post et add. cum P3 18 etiam: iterum R/etiam invenimus transp. EP3R/ante corpora add. quod R 20 quando: que P3/fuerint: fuerunt E 21 apparebunt: apparent R 22 oriatur: orta R/lux solis transp. Er/clarescent (23): clarescunt P3R 23 apparebit: apparet R 24 lapides . . . colorati: colores lapidum diaphanorum coloratorum R 25 apparebunt . . . eorum: apparent R/obscuri corr. ex obscurunt P3 26 oritur om. P1/oppositione: appositione P1S 27 post lux add. per ipsos R/ipsos om. P3R/apparebit: apparet R 28 apparebit: apparet R 30 etiam: iterum R 31 ex: in Er/parti corr. ex partis E 32 ante si add. et R 34 et . . . ei (35) om. S

35 apparebit super corpus album oppositum ei umbra tantum, et
non apparebit color.

[4.25] Et iterum invenimus pennas pavonis et pannum qui
dicitur amialmon quod diversatur in colore apud visum in di-
versis temporibus diei secundum diversitatem lucis orientis su-
per ipsa.

[4.26] Significant ergo iste dispositiones apparentes in col-
oribus quod colores corporum coloratorum non comprehen-
duntur a visu nisi secundum luces orientes super ipsa.

[CAPITULUM 5]

[4.27] Et cum luces fortes visibilium occultent quasdam res
que sunt in quibusdam visibilibus aliquando et aliquando mani-
festent res quasdam que sunt in quibusdam visibilibus, et
lucis debiles visibilium aliquando manifestant quasdam res
5 que sunt in quibusdam visibilibus et aliquando occultant quas-
dam res que sunt in quibusdam visibilibus, et corporum color-
atorum colores aliquando alterantur secundum diversitatem
lucis que oritur super ipsa, et luces fortes orientes super visum
aliquando prohibent visum a comprehensione quorumdam
10 visibilium, et visus tamen in omnibus istis nichil comprehendit
ex visibilibus nisi sit illuminata, forma ergo quod comprehendit
visus ex re visa non est nisi secundum lucem que est in illa re
visa, et secundum luces que oriuntur super visum a compre-
hensione illius rei visibilis, et super aerem medium inter visum
15 et rem visam.

[4.28] Quare vero luces fortes prohibent visum a compre-
hensione quorumdam visibilium erit declaratum a nobis apud
sermonem nostrum in qualitate visionis.

35 tantum: tertium *Er* 37 iterum *om.* P3/pennas: quod pennae R/pannum: pan-
nus R 38 post dicitur *scr. et del.* al P1/amialmon: amialmon P1/quod *om.* R/ante
diversatur *add.* id est sericus viridis mixtus cum fusco roseo R/diversatur: diversifica-
tur EP3; diversificantur R/in colore *om.* P3 41 iste *om.* *Er* 43 luces: lucis *Er*
2 post visibilibus *add.* et S/manifestent (3): manifestant *Er*P1 3 ante res *add.* nobis
EP3R/res quasdam *transp.* S/quasdam *om.* P1/et . . . visibilibus (6) *mg.* S
4 manifestant: manifestent R 5 occultant: occultent R; occultantur S
7 alterantur: alterentur R 8 ipsa *corr.* ex ipsam E/ante visum *add.* ipsum EP3R
9 aliquando: ante S/prohibent: prohibeant R/ante visum *add.* ipsum EP3R
10 in *om.* *Er*/comprehendit: comprehendat R 11 post comprehendit *scr. et del.* ex
visibilibus S 13 ante visum *add.* ipsum EP3R/a: in R/a comprehensione (14) *corr.*
ex comprehensione a *Er* 16 prohibent: prohibeant R 17 quorumdam visibilium
transp. P3R/visibilium *om.* E/erit declaratum: declarabitur R/apud . . . in (18): in ser-
mone nostro de R

[CAPITULUM 6]

[5.1] Oculus autem est compositus ex telis et corporibus diversis, et principium et incrementum eius est ex anteriori cerebri.

[5.2] Quoniam ex anteriori crescunt duo nervi obtici con-
 5 similes, et incipiunt oriri ex duobus locis a duabus partibus
 anterioris cerebri. Et dicitur quod uterque illorum habet tuni-
 cas et quod illi crescunt a duabus telis cerebri et perveniunt ad
 medium exterioris partis cerebri et anterioris. Deinde concur-
 runt et efficiunt unum nervum obticum; deinde iste nervus di-
 10 viditur et efficiuntur iterum duo nervi obtici equales consimiles.
 Deinde extenduntur isti duo nervi donec perveniant ad duo
 convexa duorum ossium concavorum continentium oculos.

[5.3] Et in duobus mediis istorum duorum concavorum os-
 sium sunt duo foramina equaliter perforata, et situs eorum ex
 15 nervo communi est situs consimilis. Illi ergo nervi intrant ista
 foramina duo et exeunt ad concava duorum ossium, et illic di-
 latantur et ampliantur, et efficitur extremitas utriusque eorum
 quasi instrumentum ponendi vinum in doleis. Et uterque ocu-
 lorum est compositus super istam extremitatem nervi que est
 20 sicut rameh, scilicet predictum instrumentum, et consolidatur
 cum ipso; et situs utriusque oculorum ex nervo communi est si-
 tus consimilis.

[5.4] Et totus uterque oculus est compositus ex tunicis multis.

25 [5.5] Prima ergo illarum est pinguedo alba que implet
 concavum ossis, et est maximum oculi, et dicitur consolida-
 tiva.

1 autem om. EErP3R/post corporibus inter. vel humoribus a. m. S 2 anteriori:
 anteriore EErRS/post anteriori add. parte R 4 anteriori: anteriore parte R
 5 duabus: duobus Er/post duabus scr. et del. arcubus P1 6 post habet add. duas R
 7 illi om. EP3R 8 et om. Er/post anterioris add. cerebri EP3R 9 efficiunt . . .
 nervum: efficiuntur unus terminus Er 10 iterum: etiam Er/post equales add.
 et EP3R 12 post duorum add. oculorum EP3R/ante oculos add. duos EP3R
 13 duobus: duorum Er/istorum om. P3/istorum . . . concavorum: concavorum . . .
 duorum Er/post duorum add. etiam EP3/ossium (14) om. P3 14 duo inter. a. m. E/
 ex: in R/post ex inter. vel in a. m. EP3 15 ergo: vero P1/ergo nervi transp. EP3R/post
 ista add. duo EP3 16 foramina duo transp. R 20 sicut . . . scilicet om. R/rameh:
 kameh Er; lameh EP3 21 situs¹ inter. a. m. S 22 post consimilis add. id est
 equalis EP3 23 tunicis multis (24) transp. Er 25 prima corr. ex prim a. m. P3/
 est: et Er 26 maximum: maxima pars R/oculi: oculis Er

[5.6] Et intra istam pinguedinem est spera rotunda concava nigra pluries et viridis et glauca in quibusdam oculis, et corpus istius spere est tenue et cum hoc densum et non rarum. Et manifestum eius est applicatum cum consolidativa, et interius eius est concavum; et in parte concavitatis est quasi quedam attritio. Et quasi consolidativa continet istam speram preter quam suum anterius quoniam consolidativa non cooperit anterius istius spere sed circulatur super anterius eius. Et ista tela dicitur uvea quia assimilatur uve.

[5.7] Et in medio anterioris uvee est foramen rotundum perforatum usque ad eius concavum, et est oppositum extremitati concavitatis nervi super quam componitur oculus.

[5.8] Et cooperit istud foramen et omne anterius uvee in cuius circuitu circulatur consolidativa extrinsecus tunica fortis alba diafona, et dicitur cornea quoniam assimilatur cornu albo claro.

[5.9] Et in pectore concavi uvee est spera parva alba humida retentibilis humiditatis, et in ea est diafonitas non intensa valde, sed in ea est aliqua spissitudo. Et diafonitas eius assimilatur diafonitati glaciei, et ideo dicitur glacialis; et nominatur hoc nomine quoniam eius diafonitas assimilatur diafonitati glaciei. Et est composita super extremitatem concavitatis nervi, et in anteriori istius spere est compressio superficialis parva, et assimilatur compressioni superficiei lenticule. Superficies ergo anterioris eius est portio superficiei spere maioris superficiei sperica continente duo eius foramina, et ista compressio est opposita foramini quod est in anteriori uvee, et situs eius ab eo est consimilis.

[5.10] Et iste humor dividitur in duas partes diverse dia-

29 pluries: ut plurimum R/quibusdam *corr. ex* quibus S 30 cum hoc: insuper R 31 consolidativa: solidativa Er; *corr. ex* consolidatum P3 32 est¹ om. EP3
33 attritio: contritio Er; *corr. ex* contritio S/consolidativa *corr. ex* consolidatam a. m. E/
speram: partem EP3 34 quoniam . . . anterius¹ (35) om. P1S 35 circulatur *corr. ex* circularit P1/post et scr. et del. et P3 36 tela: tunica R/quia om. Er 37 ante uvee
scr. et del. ve P1 38 usque ad eius *corr. ex* ad eius usque S/extremitati (39) *corr. ex*
extremitatis EP1 40 cooperit: cooperuit P3/istud: illud P1S 42 cornea *corr. ex* corneae S/quoniam: quia P3R/post albo *add. et* R 43 post claro scr. et del. et S
44 in . . . concavi: intra concavum R/spera parva *transp. Er/parva alba transp. EP3R;*
corr. ex alba parva S 45 retentibilis: receptibilis R/ante et *add. formarum visibilium* R
46 in ea est om. R 47 ideo om. Er/et² . . . glaciei (49) om. P1RS/post et² scr. et del. ideo E
48 assimilatur om. EP3 50 et: etiam S/ante istius scr. et del. spere S
51 post assimilatur scr. et del. superfi P1 53 superficiei: superficiei P1/eius om. EP3/post et *add. in* P3 54 opposita om. EP3 55 ab: cum R/ab . . . consimilis: consimilis est ab eo EP3R/est om. Er 56 duas partes *transp. EP3R*

fonitatis: et altera illarum sequitur anterius eius, et altera
sequitur eius posterius. Et diafonitas partis posterioris eius
assimulatur diafonitati vitri quasi frustati, et ista pars dicitur
60 humor vitreus. Et continet duas partes congregatas tela valde
tenuis et quasi aranea quoniam assimilatur texture aranee.

[5.11] Et in pectore concavitatis uvee dicitur quod est for-
amen rotundum, et est super extremitatem concavitatis nervi.
Et glacialis est composita in isto foramine, et rotunditas istius
65 foraminis (et est extremitas nervi) continet medium spere glac-
ialis; et consolidatur uvea cum glaciali ex circulo continenti
istud foramen. Et dicitur quod crementum uvee est ex tunica
intrinseca duarum tunicarum duorum nervorum obticorum et
quod crementum corneae est ex tunica extrinseca duarum tuni-
70 carum istius nervi.

[5.12] Et implet concavitatem uvee humor albus tenuis
clarus diafonus, et dicitur humor albugineus quoniam assimu-
latur albumini ovi in tenuitate, albedine, et diafonitate eius. Et
ipse implet concavitatem uvee, et contingit anterius glacialis, et
75 implet foramen quod est in anteriori uvee, et contingit concav-
um corneae.

[5.13] Et spera glacialis est composita super concavitatem
nervi, et sequitur concavitatem nervi humor vitreus. Erit ergo
cornea, et humor albugineus, et humor glacialis et vitreus con-
80 sequentes, et omnes iste tunice sunt diafone. Et foramen quod
est in anteriori uvee est oppositum foramini concavitatis nervi.
Erunt ergo inter superficiem corneae et anterius concavitatis
nervi multe utilitates recte quoniam sunt diafona et contin-
gentia se.

85 [5.14] Et dicitur quod spiritus visibilis emittitur ex anter-
iori cerebri et implet duas concavitates duorum nervorum
primorum coniunctorum cum cerebro; et pervenit ad nervum

57 eius om. ErP1 59 vitri mg. a. m. E/frustati: frustatim P3S; frustratim EErP1/pars
om. P1 60 post duas add. has R 61 quasi: dicitur R 62 pectore: posteriore
parte R/ante uvee add. sphaere R/dicitur quod om. Er 63 est om. P3/concavitatis
nervi corr. ex nervi concavitatis S 64 ante glacialis add. sphaera R
66 cum inter. E/ante ex add. in posito Er/ex: in R 67 crementum: ortus R
68 intrinseca: interiore R 69 crementum: ortus R/extrinseca: exteriori R
71 uvee corr. ex huve S 72 humor: homor Er; om. EP3R 73 albumini: albugini
EP3/ante albedine add. et EP3R 74 contingit: continget Er 78 nervi¹: spere P1/
erit: erunt R 79 albugineus corr. ex albuginis S/humor² om. EP3R
81 oppositum corr. ex compositum a. m. E 82 erunt . . . se (84) om. R/inter
superficiem: in superficie Er; corr. ex superficiem inter S/concavitatis: concavitatem
P3; mg. a. m. E 83 utilitates: utilitatis P3/et om. Er 86 ante cerebri add. parte R
87 primorum: predictorum Er

communem, et implet concavitatem eius, et venit ad duos
nervos secundos obticos. Et implet ipsos, et pervenit ad
90 glaciale, et dat ei virtutem visibilem.

[5.15] Et inter circumferentiam glacialis coniunctam cum
uvea et foramen quod est in concavo ossis ex quo exit nervus
est spatium aliquantulum, et nervus extenditur in isto spatio
ex fine foraminis usque ad circumferentiam glacialis secundum
95 pyramidalitatem et amplificationem. Et quantum elongabitur a
foramine tanto magis amplificabitur quousque perveniat ad
circumferentiam spere glacialis, et consolidatur cum circumfer-
entia eius.

[5.16] Et corpus consolidative continet istam partem pira-
100 midalem nervi, et continet speram uveam, et spera uvea ante-
cedit medium consolidative ad partem manifestam oculi. Et
corpus consolidative est consolidatum cum spera uvea et cum
extremitate pyramidali nervi et custodiens situm eius. Cum
ergo movetur oculus, movebitur secundum totum. Et sic dec-
105 linabitur nervus super quem componitur oculus apud motum
eius, et erit declinatio apud foramen quod est in concavitate
ossis, quoniam concavitas ossis continet totum oculum, et
oculus movetur secundum totum in ista concavitate.

[5.17] Et consolidativa consolidatur cum eo quod est in
110 anteriori eius ex nervo et ex tunicis residuis, et est custodiens
semper situm eius. Declinatio ergo nervi apud motum oculi
non est nisi a posteriori totius oculi; est ergo apud foramen
quod est in concavitate ossis. Et similiter quando oculus fuerit
quiescens et nervus fuerit declinans, non erit nisi apud foramen
115 quod est in concavitate ossis. Nam non alteratur situs parti-

88 eius: istius nervi *Er* 90 ei: ipsi *Er* 92 foramen *corr. ex foramine E/exit:*
erit *S* 93 aliquantulum: aliquantum *Er* 94 secundum *om. Er* 95 *post et*
scr. et del. amplifa P1/post quantum add. magis R/elongabitur: elongatur R 96 *ante*
tanto add. ossis EP3R/amplificabitur: amplificatur R/ante ad add. usque Er
97 consolidatur: consolidetur *R/cum om. ErP1* 99 consolidative: consolidita-
tem *Er* 100 *post uveam scr. et del. et spera uveam P1/uvea: uveae R*
101 consolidative: consolidatem *Er/ad . . . consolidatum (102) mg. a. m. S/post partem*
scr. et del. magis S 102 consolidative: consolidatem *Er* 103 pyramidali nervi
transp. P1S/nervi om. R/custodiens: custodiunt P1S; custodit R 104 *movetur corr.*
ex moveatur S/ante totum add. se R/declinabitur (105): declinabit R 105 componi-
tur: apponitur *Er* 108 oculus *corr. ex oculis S/ante totum add. se R/ista concavitate*
transp. P3 109 consolidativa: consolidatam *Er/consolidatur om. P1* 110 eius:
oculi *R/est custodiens: custodit R* 111 *semper alter. in super P3/declinatio:*
declaratio EP3/nervi mg. E/apud . . . oculi om. P1 113 *ante ossis add. totius EP3R/*
et om. R/oculus: oculi Er/oculus fuerit transp. P1/fuerit: fuit E/fuerit quiescens (114):
quieverit R 114 fuerit declinans: declinaverit *R/post erit add. declinatio R*
115 alteratur: mutatur *R*

um totius oculi adinvicem nec apud motum nec apud quietem. Declinatio ergo nervi super quem componitur oculus non est nisi apud foramen quod est in concavitate ossis sive moveatur oculus sive quiescat.

120 [5.18] Superficies autem manifesta corneae est superficies sperica et cum hoc est continuata cum superficie totius oculi et cum toto oculo. Et totus oculus est maior spera uveae quae est quidam eius. Superficies autem manifesta corneae cum superficie totius oculi est et maior superficie sperae uveae. Semidiameter ergo eius est maior semidiametro uveae.

[5.19] Et superficies intrinseca corneae superposita foramini uveae est superficies concava sperica equidistans superficiei manifeste ipsius, quoniam iste locus est equalis spissitudinis. Centrum ergo istius superficiei concavae est idem cum centro 130 superficiei manifeste convexae, et ista superficies concava secat superficiem sperae uveae super circumferentiam foraminis. Centrum ergo eius est remotius in profundo quam centrum uveae, quoniam hoc est certum in proprietatibus sperarum.

[5.20] Et etiam quia spera uveae non est in medio consolidative et est antecedens ad partem superficiei manifesti oculi, 135 et superficies manifesta oculi est ex spera maiori spera uveae, erit centrum superficiei manifeste remotius in profundo centro uveae.

[5.21] Et linea recta quae continuat duo centra—scilicet centrum superficiei corneae et centrum uveae—quando extrahitur recte, pervenit ad centrum foraminis quod est in anteriori uveae et ad duo media duarum superficierum corneae equidistantium.

116 adinvicem: inter se R 117 declinatio: declaratio EP3/ante ergo scr. et del. eius P3 118 concavitate: concavo Er 120 superficies sperica (121) transp. P3 121 cum¹ inter. E/cum hoc om. R/continuata: continua Er/cum² inter. S/totius oculi om. Er 122 post spera scr. et del. vitrea P1 123 ante cum add. est EP3R 124 ante est add. est ex superficie sperae uveae maior spera uvea Er/est et transp. EP3R/et om. Er/post uveae add. spera ergo cornea est maior spera uvea Er 125 ante ergo scr. et del. e S/est maior transp. P1 126 post et add. quia R 127 concava sperica transp. EP3R/superficiei inter. a. m. E 128 post ipsius add. corneae R/iste: ille EP3/iste locus: tota cornea R 129 ante centrum add. propterea quod R/ergo istius om. R/ante est add. etiam Er; add. corneae R/est idem transp. Er 130 superficiei manifeste transp. EP3R/post superficiei add. eius P15/ante convexae add. suae R/convexae corr. ex concave E/et ista: sed R/ante secat add. corneae R 131 post sperae scr. et del. et ista superficies concava P3/post foraminis add. quod est in anteriori parte uveae R 132 eius om. P1 133 certum: centrum EP1P3; om. R/sperarum: centrorum sperarum se intersecantium R 134 uveae: uvea EP3R 135 et est antecedens: sed antecedit R/manifesti: manifeste P3R 136 superficies corr. ex superfi P3/manifesta: manifesti Er/maiori: maiore R/maiori spera om. P3 137 post manifeste add. oculi R/centro: centri EP3 139 linea recta transp. R 140 superficiei corr. ex superficiei P3/et . . . uveae om. P1 142 superficierum: superficiei P3/equidistantium: equidistantiarum Er

Superficies enim concava corneae et superficies convexa uveae sunt superficies sperice secantes se. Nam linea que continuat
 145 centra eorum transit per centrum circuli sectionis, et erit perpendicularis super superficiem eius, nam linea que exit a centro circuli et est perpendicularis super superficiem eius transit per centra duarum sperarum.

[5.22] Et superficies concava corneae contingit superficiem
 150 humoris albuginei que est in anteriori foraminis uveae, et superponitur ipsi. Superficies ergo humoris albuginei etiam est superficies sperica cuius centrum est centrum superficiei ei superpositae. Superficies ergo manifesta corneae, et superficies intrinseca ipsius, et superficies humoris albuginei que contingit
 155 concavum corneae sunt superficies sperice equidistantes. Et centrum earum est unum punctum commune, et est remotius in profundo centro uveae.

[5.23] Et linea que transit per centrum uveae, et per centrum corneae, et per centrum foraminis quod est in anteriori uveae, quando extenditur recte, transibit per medium concavitatis nervi super quem componitur oculus, quoniam foramen quod
 160 est in anteriori uveae est oppositum foramini quod est in pectore uveae quod est extremitas concavitatis nervi.

[5.24] Et superficies anterioris glacialis etiam est sperica
 165 superficies, et ipsa secat speram uveae; centrum ergo eius est remotius in profundo centro uveae. Et linea recta que continuat duo centra eorum transit per centrum circuli sectionis, et etiam est perpendicularis super ipsum. Et circulus sectionis inter superficiem anterioris glacialis et superficiem spere uveae est aut
 170 circulus distinguens finem consolidationis inter glaciale et uveam aut equidistans ei. Quoniam superficies que est in anteriori glacialis est opposita foramini quod est in anteriori uveae, et situs eius est consimilis ex eo. Finis ergo istius super-

143 superficies² om. R 144 sunt superficies *transp.* P1/nam: et R/linea om. Er P1S/continuat *corr.* ex contini S 145 centra: centrum P1/eorum: earum R/erit: est R
 146 nam: quia R/nam ... eius (147) *mg. a. m. E* 148 centra: centrum Er 149 *post*
 et *add.* quia R 150 foraminis: foramine R/superponitur (151): supponitur P3
 151 *ante* etiam *add.* convexa R 152 est centrum om. P1/ei: ipsi R; om. P3/superpositae (153): supposite P3 154 *ante* que *add.* convexa R 155 et centrum (156): centrum igitur R 157 profundo *corr.* ex prop Er 158 per² om. P1S 162 quod
corr. ex quod P1/est³ om. Er/pectore (163): posteriore parte R 163 quod ... nervi *mg. a. m. E* 165 *ante* ergo *scr. et del.* e S/eius est *transp.* P1 167 duo om. R/eorum: earum R/et *inter.* P1/et etiam *transp.* EP3/etiam om. ErR 169 aut: autem S; om. Er
 172 quod: que E 173 eius est: eius ex eo est situs Er; *transp.* S/eius est consimilis: est consimilis eius EP3/ex: cum R/ex eo om. Er

ficiei—et est circulus sectionis inter duas superficies glacialis—
 175 aut est ipse circulus consolidationis aut equidistans ei.

[5.25] Si ergo circulus sectionis inter duas superficies glaci-
 alis fuerit circulus consolidationis, iste circulus ergo est circulus
 sectionis inter superficiem anterioris glacialis et inter superfici-
 em uvee. Et si circulus sectionis inter duas superficies glacialis
 180 fuerit equidistans circulo consolidationis spere glacialis cum
 uvea (hoc quidem accidit si fuerit consolidatio in parte pos-
 teriori glacialis), erit superficies anterioris glacialis, quando
 fuerit ymaginata extensa super illud super quod est ex sua
 spera, secans speram uvee super circumulum equidistantem isti
 185 circulo—scilicet circulo sectionis inter duas superficies glaci-
 alis—propter consimilitudinem situs istius circuli ad circumfer-
 entiam spere uvee. Et iste circulus est equidistans circulo con-
 solidationis. Erit ergo circulus sectionis inter superficiem an-
 terioris glacialis et inter speram uveam aut ipse circulus con-
 190 solidationis aut ei equidistans. Si ergo iste circulus fuerit ipse
 circulus consolidationis, linea recta que transit per centrum
 anterioris glacialis et per centrum uvee transibit per centrum
 istius circuli, et erit perpendicularis super ipsum, quoniam iste
 circulus erit circulus sectionis inter duas superficies sphericas.
 195 Et si iste circulus fuerit equidistans circulo consolidationis et
 est equidistans circulo sectionis inter duas superficies glacialis,
 est ergo cum circulo sectionis inter duas superficies glacialis in
 superficie spherica—et est superficies anterioris glacialis—et est
 equidistans ei. Linea ergo que transit per centrum uvee et per
 200 centrum superficiei antecedentis glacialis transit per centrum
 circuli consolidationis super omnes dispositiones. Et erit per-
 pendicularis super ipsum sive sit circulus consolidationis ipse
 circulus sectionis inter superficiem anterioris glacialis et inter

174 et om. *Er/post* glacialis *add.* et uveae *R; add.* aut est ipse circulus sectionis inter duas
 superficies glacialis *EP3* 175 circulus *corr.* ex circula *P1/ante* aut² *scr.* et *del.* ipse
 circulus consolidationis *S* 177 ergo *om.* *R* 178 *post* glacialis *scr.* et *del.* fuerit
 eque *S* 179 *ante* uvee *scr.* et *del.* ve *P1* 180 spere . . . glacialis¹ (182) *om.* *Er*
 181 hoc: quod *R/quidem*: quod *P1/parte* posteriori (182) *transp.* *EP3R* 182 erit:
 tunc *R/erit* . . . glacialis *om.* *P1/post* anterioris *add.* partis *EP3* 183 ymaginata:
 mente *R/post* illud *scr.* et *del.* quod sunt *P1/super*² *om.* *P1* 184 secans: secabit *R*
 186 consimilitudinem: similitudinem *EP3R/istius*: illius *P1S/ad* circumferentiam (187):
 a circumferentia *Er* 187 *post* et *add.* quia *R* 189 et *om.* *Er/inter* *corr.* ex in *S*
 190 ei equidistans *transp.* *EP3R/iste* circulus *corr.* ex circulus iste *S* 192 per¹ *om.* *P1*
 193 istius: ipsius *EP3; om.* *P1* 194 erit circulus *om.* *S/post* duas *add.* illas *R/*
 superficies sphericas *transp.* *R/ante* sphericas *add.* per *EP3* 195 et: sed *R* 196 est
om. *P3/sectionis* *corr.* ex secta *S* 198 *ante* spherica *add.* una *ErR/et*¹: quae *R*
 199 ei: circulo sectionis *R/uvee* . . . centrum¹ (200) *om.* *P1* 200 antecedentis:
 anterioris *R* 201 super: secundum *ErR/erit*: est *R* 203 sectionis: sectionis *S*

speram uvee aut sit equidistans isti circulo.

205 [5.26] Et etiam superficies anterioris glacialis et superficies
residui glacialis sunt due superficies sperice secantes se. Cen-
trum ergo superficiei antecedentis est remotius in profundo
centro superficiei posterioris; et linea recta que continuat ista
210 duo centra transit per centrum circuli sectionis, et erit perpen-
dicularis super ipsum. Et iam declaratum est quod transit per
centrum circuli consolidationis et est perpendicularis super
ipsum, nam iste circulus aut est circulus consolidationis aut
equidistans ei. Linea ergo que transit per centrum uvee, et per
centrum anterioris glacialis, et per centrum circuli consolidati-
215 onis (et est perpendicularis super istum circulum) transit per
centrum residui glacialis.

[5.27] Et cum ista linea transit per centrum residui glacialis
et per centrum circuli consolidationis, et est erecta super
superficiem circuli consolidationis secundum angulos rectos,
220 extenditur ergo in medio concavitatis nervi super quem com-
ponitur oculus, quoniam circulus consolidationis est extremitas
concavitatis nervi.

[5.28] Et iam declaratum est quod linea transiens per cen-
trum uvee, et per centrum corneae, et per centrum foraminis
225 quod est in exteriori sive anteriori uvee extenditur in medio
concavitatis nervi. Ista ergo linea que transit per duo centra
superficiei glacialis et per centrum uvee est ipsa linea que tran-
sit per centrum corneae, et per centrum uvee, et per centrum for-
aminis quod est in anteriori uvee. Ista ergo linea transit per
230 centrum corneae, et per centrum uvee, et per duo centra super-
ficiei glacialis, et per centrum foraminis quod est in anteriori
uvee, et per centrum circuli consolidationis. Et transit per duo
media tunicarum omnium oppositarum foramini uvee, et est
perpendicularis super superficies omnium tunicarum opposi-
235 tarum foramini uvee. Et est perpendicularis super superficiem

204 aut: sive R 205 etiam: iterum R/post et² add. etiam EP3 207 antecedentis:
anterioris EP3R 208 continuat: contingit EP3/ante ista inter. vel continuat a. m. E;
mg. vel continuat P3 209 erit: est R 211 circuli mg. P3 212 nam iste: hic
vero R/iste: ipse EP3/consolidationis: sectionis R 213 et: aut Er 215 istum corr.
ex ipsum a. m. E/post per scr. et del. medium P1 217 cum om. P1/ista linea transp.
R/transit: transeat R 218 est: sit R 219 superficiem circuli: circulum R
221 post oculus inter. vel circulus a. m. E/est rep. P1 225 exteriori sive om. Er/in
medio concavitatis (226) rep. P1 228 et . . . uvee om. EP3R 229 est om. EP1S
230 per² om. Er 231 et per transp. Er 232 post uvee add. ista (229) . . .
uvee (232) Er 233 oppositarum foramini: oppositorum foraminum Er/et om. Er
234 super om. Er/superficies . . . super (235) mg. a. m. E

foraminis uvee et perpendicularis super superficiem circuli consolidationis, et extenditur in medio concavitatis nervi super quem componitur oculus.

[5.29] Et cum declaratum sit quod centrum corneae et centrum
 240 trum superficiei anterioris glacialis ambo sunt super istam lineam et ambo sunt remotiora in profundo centro uvee, melius est ut centrum superficiei anterioris glacialis sit ipsum centrum corneae, ita quod centra omnium superficierum oppositarum foramini uvee sint unum punctum commune. Et sic erunt omnes
 245 lineae exeuntes a centro ad superficiem oculi perpendiculares super omnes superficies oppositas foramini. Et cum hoc posterius declarabitur apud nostrum sermonem in qualitate visionis quod centrum superficiei corneae et centrum superficiei anterioris glacialis est unum centrum commune. Superficies
 250 ergo tunicarum visus oppositarum foramini uvee sunt superficies sperice quarum centrum est unum punctum commune.

[5.30] Et etiam quia istud centrum est centrum superficiei manifeste oculi continuate cum superficie continente totum oculum (et totus oculus est rotundus nisi quantum deficit de
 255 completionem spere pinguedinis consolidative a parte anteriori ipsius oculi, et iste defectus non operatur diversitatem in motu oculi quoniam non tangit concavum ossis) istud ergo centrum erit centrum totius oculi. Ergo est intra totum oculum. Centrum ergo superficierum tunicarum visus oppositarum foramini
 260 uvee est intra totum oculum.

[5.31] Cum ergo movetur oculus, non mutabitur punctus oculi quod est centrum superficierum tunicarum visus, nec mutabitur situs eius ab istis superficiebus. Sed est custodiens
 265 situm eius, nam oculus, quando movetur, non movetur nisi secundum totum, et situs partium totius adinvicem non mutatur apud motum. Et istud centrum est intra; situs ergo eius non mutatur apud suum motum. Et similiter situs tunicarum

236 *post et add. est R/perpendicularis corr. ex perpendicularium S/circuli: speculi P3; om. P1* 239 *sit: est Er* 240 *sunt: sint R* 241 *sunt: sint R* 243 *post ita scr. et del. centrum S/quod: ut R/centra: centrum EP3* 244 *sint: sunt ErS*
 246 *cum hoc: hinc R* 247 *in: de R* 248 *quod: quia E/post quod add. centrum visionis et P3* 249 *post unum add. punctum Er* 251 *ante centrum add. cen P3*
 252 *etiam: iterum R/quia: quod EP3* 253 *manifeste: manifesti P3/continue: concavitate P3/continente: continenti Er* 254 *nisi . . . ossis (257) om. Er*
 255 *consolidative corr. ex consolidatem S/anteriori: inferiori P1S; anteriore R*
 256 *ante et scr. et del. et ste P1* 258 *intra om. S* 262 *quod: qui EP3* 263 *est custodiens: custodit R* 264 *eius: suum R* 265 *ante totum add. se R/ante et add. eius EP1P3/post totius add. eius Er/adinvicem: inter se R* 267 *situs tunicarum transp. EEP3R*

visus non mutatur apud totum oculum—id est apud motum
ipsius visus—situs ergo istius centri apud superficies tunicarum
270 visus non mutatur nec in motu nec in quiete.

[5.32] Et iam declaratum est quod declinatio nervi apud
motum visus et apud quietem non est nisi apud foramen quod
est in concavitate ossis, quoniam non est nisi a posteriori toti-
us oculi. Declinatio vero nervi apud motum visus et quietem
275 eius non est nisi a posteriori centri eius.

[5.33] Et etiam non mutatur situs partium totius oculi
adinvicem nec in motu nec in quiete. Situs ergo centrorum tuni-
carum oculi apud totum oculum non mutatur nec in motu visus
nec in quiete. Linea ergo recta transiens per centrum non mu-
280 tat suum situm apud totum oculum nec apud partes eius, sed
nec in motu nec in quiete. Et cum situs istius lineae non mutetur
apud totum oculum nec apud partes eius, situs ergo istius lineae
non mutatur apud superficiem circuli consolidationis nec apud
suam circumferentiam. Et iste circulus est extremitas concavi-
285 tatis nervi. Situs ergo superficiei eius a superficie concavitatis
nervi est situs consimilis; et declinatio partis pyramidalis nervi
super superficiem istius circuli est declinatio consimilis, quoni-
am situs glacialis ab isto nervo est situs consimilis.

[5.34] Et cum situs partium oculi non mutatur adinvicem,
290 superficies ergo concavitatis nervi a loco circumferentie circuli
consolidationis usque ad locum declinationis nervi qui est pars
pyramidalis non mutat situm eius apud totum oculum nec
apud circulum consolidationis.

[5.35] Et iam declaratum est quod situs lineae que transit
295 per centra non mutatur apud circulum consolidationis et quod
ipsa extenditur in medio concavitatis nervi. Et cum situs istius
lineae non mutatur apud circulum consolidationis, nec superfi-
cies concavitatis nervi que est a loco circumferentie circuli con-
solidationis usque ad locum declinationis mutat suum situm

268 visus *om.* EP3R/id est *om.* Er 269 ipsius *om.* Er/superficies: superficiem R
271 declinatio: declaratio P3 272 motum: motus EP3/ante non *add.* eius Er/apud
foramen *corr.* ex foramen apud S/ante quod *add.* oculi EP1P3R 274 declinatio:
declaratio P3/vero: ergo Er; *om.* P1/ante apud *scr.* et *del.* po S 275 eius¹ *om.* P1R
276 etiam *om.* EP3R 277 adinvicem: inter se R 278 totum *om.* P1S 279 recta
om. R/transiens *corr.* ex transiens S 280 post suum *add.* locum vel EP3R/sed: scili-
cet EP3R 286 est *corr.* ex et a. m. E/declinatio: declaratio P3 288 situs¹: sicut P1
289 cum *om.* EP1P3R/adinvicem: inter se R 290 nervi *corr.* ex nervo Er 291 ante
usque *scr.* et *del.* nervi P1 292 eius: suum R 295 centra: centrum Er/ante non
add. omnia R/et . . . consolidationis (297) *om.* Er 296 cum: quod EP3/ante situs *inter.*
vel cum a. m. EP3/istius *corr.* ex ipsius S 297 lineae *corr.* ex lib S/mutatur: mute-
tur R 299 suum situm *transp.* P1

300 apud circulum consolidationis, ista ergo linea non mutat suum
situm apud concavitatem nervi quousque pervenit ad locum
declinationis. Linea ergo que transit per centrum tunicarum
visus transit per centrum circuli consolidationis, et erit erecta
super ipsum secundum angulos rectos, et extenditur in medio
5 concavitatis nervi pyramidalis quousque perveniat ad locum
declinationis nervi. Et erit situs suus semper a superficie con-
cavitatis nervi que est intra totum oculum, et ab omnibus par-
tibus oculi, et ab omnibus superficiebus tunicarum visus idem
situs, et non mutatur nec in motu visus aut in quiete eius.

10 [5.36] Isti ergo sunt situs tunicarum visus et situs centro-
rum earum et situs lineae recte transeuntis per centra earum.

[5.37] Oculi autem ambo sunt consimiles in omnibus suis
dispositionibus et in suis tunicis, et in figuris suarum tunica-
rum, et in situ cuiuslibet tunice respectu totius oculi. Et cum
15 ita est, situs cuiuslibet centrorum quorum distinctio declarata
fuit apud totum oculum et apud partes eius est sicut situs cen-
tri respondentis illi centro in alio oculo apud totum illum ocu-
lum et apud partes eius. Et cum situs centrorum in utroque
oculo est similis situi suorum respondentium in oculo reliquo,
20 erit situs lineae transeuntis per centra in uno oculorum apud
totum oculum, et apud partes eius, et apud suas tunicas simi-
lis situi lineae transeuntis per centra alterius oculi apud totum
oculum, et apud partes eius, et apud suas tunicas. Situs ergo
linearum transeuntium duarum per centra tunicarum visus ab
25 utroque oculorum est situs consimilis in omnibus suis dispo-
sitionibus.

[5.38] Et utraque consolidatarum consolidatur cum eis,
cum ex eis exeunt duo lacerti parvuli, et unus eorum est in

300 circulum *corr. ex circumferentiam* P1/circulum . . . apud (1) *mg. a. m. E* 1 per-
venit: perveniat R 2 centrum: centra R 3 visus *om. R/transit: pertransit* P1/
circuli *om. EP3R/erit: est R/erecta corr. ex erectum* P3; *corr. ex recta* S 6 situs . . .
semper: finis situs nervi per Er/semper *inter. E* 7 partibus . . . omnibus (8) *om. P1*
8 *post idem inter. vel idem est a. m. E* 9 aut in quiete: neque motu R 12 suis
dispositionibus (13) *transp. S* 13 in² *om. EP3R* 14 cum *inter. E* 15 est: sit
R/post situs *add. ergo R/ante quorum scr. et del. quousque* P3 16 fuit: aut S/post
eius *add. non P1/sicut situs corr. ex situs sicut* Er 17 illum oculum (18) *transp. EP3R*
19 est: sit R/situi: situs EP1P3R; situm Er; *om. S/suorum . . . reliquo om. R/in: alio*
EP3/post in *scr. et del. fine P1/oculo² corr. ex loc E/oculo reliquo transp. Er/reliquo*
om. EP3 20 centra: centrum R 21 apud¹ *corr. ex apart E/similis* (22) *corr. ex si-*
mul S 22 lineae transeuntis *transp. Er/centra: centrum R/oculi om. Er/post totum*
add. illum Er 23 oculum: locum Er 24 linearum . . . duarum: duarum . . .
transeuntium EP3R 25 oculorum: oculo R/ante suis *scr. et del. visibilibus* P1
27 consolidatarum: consolidativa Er; *om. P1/cum eis om. P1* 28 cum *corr. ex et E/*
ex inter. P1/exeunt: exeant R/lacerti: lateri Er/et: quorum R/eorum om. P3R/
est: om. P3

parte lacrimarum oculi et alius in parte posteriori. Et contin-
 30 ent utrumque oculorum palpebre et cilia.

[5.39] Hoc ergo quod declaravimus est dispositio compo-
 sitionis oculi et forma eius et forma suarum tunicarum. Et om-
 ne quod diximus ex tunicis oculi et compositione earum iam
 declaratum est ab anatomicis in libris anatomie, et ista est
 35 forma oculi.

[CAPITULUM 7]

[6.1] Iam declaratum est superius quod ex quolibet corpore
 illuminato cum quolibet lumine exit lux ad quamlibet partem
 oppositam ei. Cum ergo visus opponitur alicui rei vise et fuerit
 res illa illuminata cum quolibet lumine, ex lumine rei vise veniet
 5 lumen ad superficiem visus. Et declaratum fuit quod ex pro-
 prietate lucis est operari in visum et quod natura visus est pati
 ex luce. Dignum ergo est ut non sentiat visus lumen rei vise nisi
 ex lumine veniente ex ea ad visum.

[6.2] Et declaratum fuit iam quod forma coloris cuiuslibet
 10 corporis colorati et illuminati cum quolibet lumine associatur
 semper lumen veniens ab illo corpore ad quamlibet partem
 oppositam illi corpori, et erit lumen et forma coloris semper
 similis. Ergo cum lumine veniente ad visum ex lumine corporis
 visi erit semper forma coloris corporis visi, et cum lumen et
 15 color venient simul ad superficiem visus, et visus sentit color-
 em qui est in re visa ex lumine veniente ei ex re visa, dignius est
 ut non sit sensus visus coloris rei vise nisi ex forma coloris ve-
 nientis ad ipsum visum cum lumine.

[6.3] Et etiam forma coloris semper est admixta cum forma
 20 luminis, et non est distincta ab eo. Visus ergo non sentit lumen
 nisi admixtum cum colore. Dignius ergo est ut non sit sensus
 visus coloris rei vise et luminis quod est in ea nisi ex forma ad-

29 posteriori: posteriore R/continent (30): continuent P1 30 post utrumque scr. et
 del. olo Er/oculorum: oculum R/cilia corr. ex similia P1 31 quod om. Er 33 ex:
 de EP3R 34 anatomicis corr. ex atonatomicis Er/anatomie corr. ex anatomice P1/et
 ... oculi (35) om. R 1 quolibet corpore transp. EP3R 5 post et add. iam P1/fuit
 corr. ex est P1 6 natura: non P3/est² om. P3/post pati mg. nisi P3 7 ergo est
 transp. EP3 9 fuit: est P1/forma: forme P1/cuiuslibet corr. ex cuius P1 11 lumen
 veniens: lumini venienti R 13 similis: simul P1RS 14 semper forma transp. EP3
 15 venient: veniet Er; veniant R/post superficiem scr. et del. ve P1/visus¹ om. P1/
 et om. R 16 ei: ad se R/est²: est ergo EErP3; ergo est R 19 etiam: est Er/om. R
 20 luminis: lucis R/distincta: distantia EErP1P3S/ante ab add. vel distincta EP3S (mg.
 P3S)/eo: ea R 21 dignius: dignum P1S/post ut scr. et del. q S

mixta ex lumine et colore veniente ad ipsum ex superficie rei vise.

25 [6.4] Et etiam tunice visus que situantur ad medium anterioris visus sunt diafone contingentes se, et prima illarum, scilicet cornea, tangit aerem in quo primo venit forma. Et ex proprietatibus lucis est pertransire in quodlibet corpus diafonum, et similiter est proprietas forme coloris que associatur lumini
30 pertransire in corpus diafonum. Et ideo extenditur in aere diafono sicut extenditur lumen. Et ex natura corporum diafonorum est recipere formas lucis et colorum et redere ipsas partibus oppositis illi. Forma ergo veniens ex re visa ad superficiem visus transibit per diafonitatem tunicarum visus ex
35 foramine quod est in anteriori uvee. Perveniet ergo ad humorem glaciale et pertransibit in eo etiam secundum suam diafonitatem. Dignius ergo est ut tunice visus non fuerint diafone nisi ut pertranseant in eis forme lucis et colorum venientium ad ipsum.

40 [6.5] Aggregemus ergo modo quod componitur ex omnibus istis.

[6.6] Et dicemus quod visus sentit lumen et colores que sunt in superficie rei vise, et pertranseunt per diafonitatem tunicarum visus. Et hoc est illud in quo quiescebat opinio
45 naturalium in qualitate visionis.

[6.7] Dicemus ergo modo quod qualitas visionis non asseritur esse huiusmodi tantum, quoniam iste modus destruitur nisi addatur ei aliud, quoniam forma lucis et coloris cuiuslibet corporis colorati et illuminati extenditur in aere diafono continuo
50 tuato cum eo ad omnes partes oppositas. Visus autem opponitur in eodem tempore rebus multis visis diversi coloris, et inter quamlibet earum et visum sunt in aere linee recte continu-

23 ex¹: cum R/post ex² scr. et del. circumferentia P1 25 etiam: iterum R/situantur:
verticantur P1S/ante ad inter. vel situantur a. m. S 26 se om. EErP3 27 aerem
om. EP3 29 associatur: associantur P1 32 colorum: coloris R; corr. ex coloris P3
33 post partibus add. sibi R/illi: illis P3; om. R; corr. ex illis a. m. E 34 ante visus¹ scr.
et del. e S/transibit: transit P1/ex foramine (35): per foramen R 35 in anteriori: ex
anteriori R/perveniet: pervenit Er 36 etiam om. R/suam diafonitatem (37)
transp. EErP3R 37 fuerint: sint EP3R/ante diafone scr. et del. dip P3 42 dicemus:
dicamus R/post quod scr. et del. istis P3/que: qui EP3R 43 post et add. quod R/
pertranseunt: transeunt P3 44 illud: istud S/opinio corr. ex optio S/opinio . . . in
(45): physicorum opinio de R 45 qualitate corr. ex quantitate S 46 modo mg.
E/quod: forme que P3/ante visionis scr. et del. qn P1 47 esse inter. E/esse huius-
modi transp. EP3R/destruitur: destruitur S 48 ante forma add. enim R/ante et
scr. et del. is P3 49 corporis om. R 50 cum corr. ex et a. m. E 51 in om. R/
eodem corr. ex eadem P3/rebus multis transp. R/diversi om. Er

ato medio inter eas. Et cum forme lucis et coloris que sunt in
 re visa opposita visui venient ad superficiem visus, forme lucis
 55 et coloris cuiuslibet rerum visibilium oppositarum visui in eo-
 dem tempore veniunt in illo tempore ad superficiem visus. Et
 cum forme extenduntur ex re visa ad quamlibet partem oppos-
 itam et non perveniunt ad visum nisi propter oppositionem,
 forma que pervenit ex re visa ad visum pervenit ad totam
 60 superficiem visus. Et cum ita est, quando visus opponetur
 alicui superfici rei vise, et pervenerit forma coloris eius et
 lucis ad superficiem visus, et viderit in illo tempore aspiciens
 alia visibilia diversi coloris opposita visui, tunc forma lucis et
 coloris cuiuslibet illorum visibilium veniet ad superficiem visus.
 65 Et erit forma omnium illorum visibilium perveniens ad totam
 superficiem visus. Perveniet ergo ad totam superficiem visus
 et in tota multa lumina diversa et multi colores diversi, et
 quodlibet illorum implet superficiem visus. Pervenit ergo in
 superficie visus forma admixta ex coloribus diversis et lumini-
 70 bus diversis.

[6.8] Si ergo visus senserit illam formam admixtam, sentiet
 colorem diversum a colore cuiuslibet illarum rerum, et non dis-
 tinguentur ab eo visibilia. Et si senserit unam illarum rerum
 visibilium et non senserit residuas, comprehendet unam rem
 75 visibilem et non alias. Sed ipse comprehendit omnia illa visi-
 bilia in eodem tempore, et comprehendit ipsa distincta.

[6.9] Et si non senserit unam illarum formarum, nichil sen-
 tiet ex ipsis visibilibus oppositis illi. Sed ipse sentit omnia.

[6.10] Et iterum erunt in eodem viso diversi colores et line-
 80 ares secundum ordinem, et a qualibet parte eius exit lumen et
 color secundum omnes lineas rectas que extenduntur in aere
 continuo. Cum ergo fuerint partes unius rei vise diversi coloris,
 veniet ad totam superficiem visus ex unoquoque illorum forma

54 venient: veniant R/forme . . . visus (56) *mg. a. m. E/post forme add. ergo R*
 55 rerum: super Er 56 veniunt: venient EP3R/in . . . tempore *om. EP3R*
 57 extenduntur: extendantur R 58 ante et *add. visui P1/perveniunt: perveniant R*
 59 ad visum *om. Er* 60 est: sit R/opponetur: opponitur EEP3R 61 rei *om. P1S/pervenerit: pervenit EP3R* 63 et *om. Er* 64 coloris cuiuslibet *transp. EP3/post coloris add. et ErP1S (inter. et S)* 65 erit: ex P1; *om. R/perveniens . . . visus¹ (66) om. P1* 66 perveniet: pervenient RS/ante ergo *add. et Er* 67 et in tota *om. R/multa lumina corr. ex lumina multa P3/colores: coloris Er* 68 quodlibet: quilibet R/illarum: eorum Er/pervenit: perveniet R 71 visus senserit *transp. R* 72 a colore: ad calore ErS 73 illarum *corr. ex illam P3* 74 comprehendet: apprehendet P1S 78 post ipsis *add. vel ex aliis EEP1R/illi: illis P3; corr. ex illis a. m. E* 79 erunt: possunt esse R/viso: visu EP3/et² . . . ordinem (80) *om. R* 80 ante et¹ *scr. et del. et a qualibet E/exit: extra P3* 83 illorum: illarum R

coloris et lucis; et sic admiscebuntur colores illarum partium in
 85 superficie visus, quare visus comprehendet ipsos aut admixtos
 aut nichil comprehendet ex eis. Si vero comprehendit eos ad-
 mixtos, non distinguuntur nec ordinabuntur ab eo partes sive
 colores partium. Et si nichil comprehendit ex illis formis, nichil
 comprehendit ex partibus; et si nichil ex partibus, nichil com-
 90 prehendit ex re visa. Sed visus comprehendit rem visam illu-
 minatam oppositam sibi, et comprehendit partes eius diversi
 coloris ordinatas et distinctas.

[6.11] Et cum ita est, constat quoniam aut qualitas visionis
 erit alio modo aut erit iste modus pars modi videndi. Debe-
 95 mus ergo considerare utrum iste modus possit convenire con-
 ditionibus per quas distinguuntur colores rerum visibilium, et
 ordinantur partes eorum apud visum et erunt convenientes ad
 esse.

[6.12] Dicemus ergo quod quando visus fuerit oppositus
 100 alicui rei visibili, veniet ex quolibet puncto superficiei rei vise
 forma et coloris et lucis que sunt in ea ad totam superficiem
 visus. Et ex quolibet puncto cuiuslibet rerum visibilium op-
 positarum visui in illa dispositione etiam venient forme coloris
 et lucis que sunt in illo ad totam superficiem visus. Si ergo vi-
 105 sus senserit ex tota eius superficie formas coloris et lucis que
 veniunt ex aliquo puncto superficiei rei vise, sentiet ex tota
 eius superficie formam cuiuslibet puncti superficiei illius rei
 vise et formam cuiuslibet puncti superficierum omnium rerum
 visibilium oppositarum illi in illa dispositione. Et sic non or-

84 et² om. EErP3/admiscebuntur: permiscebuntur R 85 quare: quia P1; inter. a. m. E/visus² inter. a. m. E/visus comprehendet: comprehendit visus EP3R/ipsos: illos EErP3/aut om. EErP3R 86 aut corr. ex ad Er/ante ex scr. et del. ex P3/comprehendit: comprehendet EP3R 87 distinguuntur: distinguuntur R 88 ex: in Er/illis: istis R/formis: forma P3 89 comprehendit: comprehendet ErR/post ex¹ add. illis EP3; add. istis R/ante ex² add. comprehendit R/comprehendit (90): comprehendit P3 90 visam corr. ex viam P3/illuminatam . . . sibi (91): oppositam . . . illuminatam EP3R 93 cum inter. S/est: sit R/quoniam: quod R 94 erit¹ om. P3/post pars add. propositi R/post videndi add. intenti EP3 (videndi intenti corr. ex intenti videndi E) 96 quas om. Er/distinguuntur: distinguantur R; corr. ex distinguitur S/post et inter. per quas a. m. S 97 eorum: earum R/erunt convenientes: conveniunt R/ad esse (98): ad eorum in corpore esse EP3; ad eorum esse in corpore R 98 post esse add. eorum P1 99 dicemus: dicimus EP3R/quando visus corr. ex visus quando S 100 quolibet corr. ex quilibet P1 102 rerum visibilium transp. P3 103 post illa add. dis P1 104 illo: illis R/si ergo visus (105) om. P1 106 puncto: punctorum P15/superficiei . . . puncti (107) mg. a. m. S 107 formam corr. ex formas Er/superficiei: superfi-
 cierum EP3/illius om. EP3R 108 post superficierum add. illius (107) . . . superfi-
 cium (108) ErP15 (mg. S)/rerum visibilium (109) transp. EErP3R/rerum . . . opposi-
 tarum (109): oppositarum . . . visibilium P15 109 oppositarum: oppositorum Er

110 dinabuntur ab eo partes unius rei vise nec distinguuntur ab eo.
 [6.13] Et si senserit formam venientem ex uno puncto superficiei rei vise ad totam superficiem visus ex uno puncto tantum ex superficie ipsius visus, et non senserit formam illius puncti ex tota eius superficie, ordinabuntur ab eo partes rei
 115 vise, et distinguuntur omnia visibilia opposita. Quoniam quando comprehenderit colorem puncti unius ex uno puncto tantum superficiei eius, comprehendet colorem unius partis rei vise ex una parte superficiei sue, et comprehendet colorem alterius partis ex alia parte superficiei sue. Et comprehendet
 120 unamquamque partem visibilium ex loco sue superficiei diverso ei per quem comprehendet aliam rem visibilem, quare visibilia erunt ab eo ordinata et distincta; et similiter partes cuiuslibet illorum.

[6.14] Modo ergo consideremus utrum hoc sit possibile et
 125 conveniens ad esse. Et dicamus prius quod visio non est nisi per glaciale, sive sit visio per formas venientes ex re visa ad visum sive secundum alium modum. Visio autem non est per unam aliarum tunicarum antecedentium sibi, quoniam ille tunicæ antecedentes non sunt nisi instrumenta glacialis. Quoni-
 130 am si contingit humori glaciali occasio cum salute aliarum tunicarum, destruetur visio; et si acciderit residuis tunicis occasio remanente sua diafonitate cum salute glacialis, non cassabitur visus. Et iterum si in foramine uvee fuerit opilatio et destruatür diafonitas humoris eius, destruetur visus cum
 135 salute corneæ; et si auferatur opilatio, revertetur visus. Et similiter si pervenerit intra humorem albugineum pars grossa non diafona, et fuerit in facie humoris glacialis et medians inter ipsum et foramen uvee, destruetur visio; et cum auferetur illud

110 distinguuntur: distinguuntur EP3 111 si om. P3/formam venientem inter. a. m. E 113 ex superficie: superficiei R/illius: ipsius P3 114 ex om. R/rei: res Er 117 comprehendet: comprehenderet P1/rei vise (118) corr. ex vise rei P3
 118 post et scr. et del. com. P1 119 alia: illa Er 120 sue om. P3/sue superficiei transp. R/post superficiei add. toto ei opposito et EP3 (opposito et alter. ex et opposito E)/diverso ei (121) transp. Er 121 ante ei add. et opposito P1R/ei om. EP3/comprehendet: comprehendit R 124 possibile et conveniens (125): conveniens et possibile EP3R 125 ad om. EP3/visio corr. ex visi a. m. E 126 formas corr. ex mas S
 127 ante visum scr. et del. vi P3/est inter. a. m. E 128 sibi: ei EP1P3; se R/post sibi mig. vel sibi a. m. E 129 antecedentes om. EEerP3R/instrumenta: instrumentum R
 130 contingit: contingerit R/occasio: laesio R 131 destruetur: destruitur EP3R/si om. Er 132 occasio: corruptio R/sua: ipsarum R 133 cassabitur: cessabitur P3; corrumpetur R; corr. ex cassabuntur P1/iterum: etiam R 134 ante visus scr. et del. cum Er; scr. et del. est P3 135 opilatio corr. ex opulatio S/revertetur: revertitur EP3
 136 ante intra add. visus P3/grossa: crassa R 137 humoris inter. a. m. S/medians: media R 138 cum: quando R

grossum vel declinabitur a verticatione recte que est inter glaci-
 140 alem et foramen uvee ad aliquam partem, revertetur visus. Et
 omnibus istis attestatur medicina.

[6.15] Destructio ergo sensus apud corruptionem glacialis
 cum salute tunicarum antecedentium illi est significatio quod
 sensus non est nisi per istum humorem, non per tunicas residu-
 145 as antecedentes illi. Et destructio sensus apud destructionem
 diafonitatis que est inter glaciale et superficiem visus per
 corpus densum non translucens significat quod diafonitas is-
 tarum tunicarum non est nisi ut continuetur diafonitas tunica-
 rum visus cum diafonitate aeris et efficiantur corpora que sunt
 150 inter glaciale et rem visam diafona continueate diafonitatis.
 Et destructio sensus apud abscisionem linearum rectarum que
 sunt inter glaciale et superficiem visus significat quod sensus
 glacialis non erit nisi ex lineis rectis que sunt inter ipsam et su-
 perficiem visus.

[6.16] Dicemus ergo si sensus visus ex colore rei vise et lu-
 155 cis que sunt in eo est ex forma veniente ex rebus visis ad su-
 perficiem visus, et sensus non est nisi per glaciale, ergo non
 per superficiem visus sentiet visus istam formam nisi post-
 quam transierit superficiem visus et pervenerit ad glaciale.
 160 Et forma que venit ex re visa ad superficiem visus pertransit in
 diafonitate tunicarum visus, quoniam ex proprietate diafoni-
 tatis est ut transeant in ea forme lucis et colorum et extendan-
 tur recte. Et iam declaravimus hoc in aere; et cum fuerint ex-
 perimentata omnia corpora diafona, invenietur quod lux non
 165 extendetur in eis nisi secundum lineas rectas. Et nos declara-
 bimus post apud nostrum sermonem in obliquate quomodo

139 grossum: crassum R/a inter. S/verticatione: versione EErP1P3R/ante recte add. vel
 verticatione EErP3; add. linee R/post recte add. linee EP1P3 140 ante ad scr.
 et del. destruetur visio S 141 post istis scr. et del. altere P3/attestatur corr. ex
 attestabitur E 142 post sensus add. visus est EP3R; inter. visus a. m. S 143 illi:
 illum R/post illi add. et illud EP3R; add. et Er/post est add. etiam P1S/significatio: argu-
 mentum R 144 residuas (145) om. P1 145 illi: illum R 146 et om. S/ante
 visus scr. et del. et superficiem S 147 post non add. est EP3/significat: est significatio
 S; om. Er/quod: et EP3 148 tunicarum (149) mg. E 150 continueate: continuata
 Er; continuitate R 151 abscisionem: destructionem EP3R/ante linearum mg. vel
 abscisionem EP3 (a. m. E); scr. et del. line P1/rectarum om. R 152 et superficiem rep.
 P1/quod rep. Er 153 inter ipsam: intra ipsum Er (alter. ex ipsum intra Er)/ipsam:
 ipsum EP3R 155 ante ex add. est EP3R 156 est: et EErP3R 157 ante et scr.
 et del. et non P1/non² om. P3 158 sentiet: sensiet S/nisi: sed R 159 ad glaciale
 om. P3 160 que: autem Er 161 diafonitatis (162) corr. ex diafonitas S
 162 forme corr. ex forma P1/extendantur (163) corr. ex extendatur Er 163 ante hoc
 scr. et del. est P1 164 non om. R 165 extendetur: extenditur EErP3R/nisi om. R/
 post et scr. et del. n Er/declarabimus (166): declaravimus P3 166 nostrum ser-
 monem transp. EP3/in: de R

illud experimentabitur. Si ergo sensus visus lucis et coloris que
sunt in re visa est ex forma veniente ad visum ex re visa, apud
perventionem ipsius forme ad glaciale erit sensus. Et iam
170 declaratum est quod non est possibile ut visus comprehendat
rem visam secundum suum esse nisi quando comprehenderit
formam unius puncti rei vise ex uno puncto tantum sue super-
ficies. Non est ergo possibile ut glacialis comprehendat rem
visam secundum suum esse nisi quando comprehenderit color-
175 em unius puncti rei vise ex forma perveniente ad ipsum ex uno
puncto tantum superficies visus. Forma autem venit ex quoli-
bet puncto superficies rei vise, et pertransit totam visus super-
ficiem usque ad interius. Si vero ex eo quod venit ex uno
puncto rei vise ad totam superficiem visus et pertransit tuni-
180 cas visus et pervenit ad glaciale non comprehendit glacialis
nisi quod venit ad ipsam ex uno puncto tantum superficies
visus, et sentit colorem illius puncti tantum ex superficie visus
et pervenit ad unum punctum tantum superficies eius, et non
comprehendit illud punctum rei vise ex residua forma perveni-
185 ente ad superficiem eius ex residua superficie visus, complebi-
tur visio, et ordinabuntur partes rei vise, et distinguuntur res
vise apud visum.

[6.17] Et non complebitur visio nisi sit secundum illum
modum. Et hoc non potest esse ita nisi quando fuerit unum
190 punctorum que sunt in superficie visus per quam transit forma
unius puncti superficies rei vise distinctum a punctis residuis
que sunt in superficie visus, et fuerit linea super quam venit
forma ad illud punctum superficies visus distincta a residuis
lineis super quas venit forma. Et propter hoc potest glacialis
195 comprehendere formam venientem super illam lineam et ex
puncto superficies visus qui est super illam lineam, et non
potest comprehendere ipsam per aliam.

167 illud: hoc R; istud S/experimentabitur: experiendum sit R 169 perventionem:
pervenientem P3/post erit scr. et del. erit S 170 est¹ om. S/post est¹ add. ante hoc EP3;
add. antea R/est² inter. a. m. E 171 quando corr. ex quoniam Er 172 puncti mg.
E/ex . . . vise (175) mg. a. m. E/post uno scr. et del. quoque P1/sue inter. a. m. S
173 ergo possibile transp. Er 175 forma corr. ex forme S/forma perveniente corr. ex
perveniende forma Er/perveniende: veniente EP3R 176 ante venit add. aut P3/venit
corr. ex pervenit P1 178 eo: ei Er 181 ipsam: ipsum RS/superficies corr. ex
superficiem S 183 post ad scr. et del. illum punctum P1 184 ante illud scr. et del.
eius Er 185 ante visus scr. et del. eius P1 187 vise: in se ER/post apud scr. et del.
superficiem P1 188 sit om. EP3R/illum: istum EErP3R 189 modum om. P1/
quando corr. ex quod P3 190 forma om. P3 193 illud: aliud Er 195 ante super
scr. et del. puncto Er/lineam corr. ex lile S/et om. P1 196 qui: quod R/ante et scr. et
del. et ex puncto superficies visus que est super illam lineam E 197 ipsam: ipsum
S/aliam: alia E

[6.18] Et cum inducantur luces et experimentetur qualitas transitus earum et extensionis earum in corporibus diafonis, inveniatur quod lux extenditur per corpus diafonum secundum lineas rectas, dum corpus diafonum fuerit consimilis diafonitatis. Et cum occurrerit corpus aliud diverse diafonitatis a diafonitate precedentis corporis in quo extendebatur, non pertransibit secundum rectitudinem linearum super quas extendebatur ante nisi quando ille lineae fuerint perpendiculares super superficiem secundi corporis diafoni. Et si ille lineae fuerint oblique super superficiem secundi corporis et non perpendiculares, obliquabitur lux apud superficiem secundi corporis, et non extendetur recte. Et cum obliquatur, extendetur in secundo corpore secundum illas lineas rectas super quas obliquabatur; et erunt lineae super quas obliquabatur lux in secundo corpore etiam declinantes super superficiem secundi corporis et non perpendiculares. Et si fuerint quaedam lineae super quas venit lux in primo corpore perpendiculares super superficiem secundi corporis et quaedam declinantes, extendetur lux que erit super lineas perpendiculares in corpore secundo secundum rectitudinem. Et que erit super lineas declinantes obliquabitur apud superficiem secundi corporis secundum lineas declinantes, et extendetur in eo secundum rectitudinem illarum linearum declinantium super quas obliquabatur. Et hoc nos declarabimus in sermone de obliuatione, et ostendemus viam per quam poterit quis experimentari istam dispositionem, et apparebit sensui, et cadet super ipsam certitudo.

[6.19] Et cum ita est, forma ergo lucis et coloris que veniunt ex quolibet puncto rei vise ad superficiem visus, quando pervenerit ad superficiem visus, nichil pertransibit ex eis per diafonitatem tunicarum visus secundum rectitudinem nisi illud

198 inducantur: iudicantur P3; inducuntur R/experimentetur: experimentator R; corr. ex experimentur S; corr. ex ex premit Er 199 earum¹: eorum Er 200 secundum: per P3 201 ante dum scr. et del. dum S 202 occurrerit: occurrent Er/aliud: istud Er 203 diafonitate corr. ex diafono P1/precedentis corporis transp. EP3R/non... extendebatur (204/205) om. S/pertransibit (204): transibit P1 204 secundum: per P3 206 ante diafoni scr. et del. et non perpendiculares E/et corr. ex quia E/post fuerint scr. et del. s P3 208 secundi corporis transp. P3 209 et² corr. ex quia E/in om. S 210 post quas scr. et del. super obliquatur P3 214 venit lux om. P1/primo corr. ex secundo a. m. E/super² om. P3 216 ante in scr. et del. lineas E/corpore secundo (217) transp. EP3R 217 erit: erat R 219 in corr. ex inter P1 220 post super scr. et del. hoc S/post hoc scr. et del. non Er 221 nos declarabimus corr. ex declarabimus nos Er/obliuatione: refractione R 222 poterit corr. ex potuit E/experimentari: experiri R 223 ipsam: istam P1 224 est: sit R 226 ex eis om. R 227 post visus scr. et del. visus S

quod erit super lineam rectam elevatam super superficiem
visus secundum angulos rectos. Et illud quod fuerit super ali-
230 am lineam reflectetur et non pertransibit recte, quoniam dia-
fonitas tunicarum visus non est sicut diafonitas aeris contin-
gentis superficiem visus; et illud quod reflectitur ex istis formis
reflectetur etiam super lineas declinantes, non super lineas
perpendiculares extensas ex locis reflexionis. Et nulla linea
235 recta exit ad aliquod punctum superficiei visus ab uno puncto
superficiei rei vise ita quod sit perpendicularis ad superficiem
visus nisi una linea tantum, et exeunt ad eam lineae infinite
declinantes super superficiem visus. Et forma veniens secun-
dum rectitudinem perpendicularis pertransit tunicas visus
240 secundum rectitudinem perpendicularis, et omnes forme veni-
entes super lineas declinantes ad illud punctum reflectuntur ad
illud punctum, et transeunt in tunicis visus secundum lineas
declinantes etiam. Et nichil transit ex eis secundum latitudi-
nem linearum super quas venerunt nec secundum rectitudinem
245 perpendicularis erecti super illud punctum.

[6.20] Et ad quodlibet punctum superficiei visus veniunt in
eodem tempore forme omnium punctorum que sunt in super-
ficiebus omnium visibilium illuminatorum oppositorum illi in
illo tempore, quoniam inter ipsum et quodlibet punctum op-
250 positum illi est linea recta. Et a quolibet punctorum que sunt
in superficiebus visibilium illuminatorum extenduntur forme
eius super quamlibet lineam rectam que potest extendi ex illo
puncto, et forma unius puncti tantum de numero omnium
punctorum oppositorum visui que venit ad illud punctum
255 superficiei visus in illo tempore venit super perpendicularem
elevatam super illud punctum superficiei visus. Et forme
omnium punctorum residuorum veniunt ad illud punctum
superficiei visus super lineas declinantes. Et in quolibet

230 *ante lineam scr. et del. rem P3/lineam om. EP3R/reflectetur: refringetur R/pertran-*
sibit: transibit P1S 231 *sicut: nisi Er* 232 *reflectitur: refringitur R; corr. ex*
reflectatur P3 233 *reflectetur: reflectitur Er; refringetur R/lineas²: lineam P1*
234 *locis: loco EP3R/nulla: una R* 235 *post recta add. tantum R/aliquod om. EErP3R*
236 *post vise add. spere et Er/quod: ut R* 237 *nisi . . . tantum om. R/post una add.*
puncta Er 240 *omnes mg. E* 241 *super: secundum EP3R/reflectuntur:*
refringuntur R/ad²: apud EP3R 242 *illud: istud S/tunicis visus transp. Er*
243 *etiam om. R/et om. Er/transit ex eis: ex eis transit R/latitudinem (244): extension-*
em R 244 *post nec add. etiam EP3R* 245 *ante perpendicularis add. linearum R/*
perpendicularis: perpendiculariter R; alter. in perpendiculariter a. m. E/erecti: erectarum
R/illud om. P1 246 *ad: quod S* 248 *post visibilium add. etiam EP3; add. et ErR*
249 *post et add. inter Er* 250 *a quolibet: ad quodlibet P1S* 252 *eius om. R/post*
eius scr. et del. vel E/ante lineam add. secundum EP3 253 *omnium om. EP3*
256 *superficiei: superficie P3*

puncto superficiei visus transeunt in eodem tempore forme
 260 omnium punctorum que sunt in superficiebus omnium visi-
 bilium oppositorum in illo tempore. Et forma unius puncti
 tantum transit recte per diafonitatem tunicarum visus, et est
 punctus qui est apud extremitatem perpendicularis exeuntis
 ab illo puncto superficiei visus. Et forme omnium punctorum
 265 residuorum reflectuntur apud illud punctum superficiei visus,
 et transeunt per diafonitatem tunicarum visus secundum lineas
 declinantes super superficiem visus.

[6.21] Et etiam ex quolibet puncto superficiei glacialis exit
 una linea tantum perpendicularis super superficiem visus. Et
 270 exeunt ex eo lineae infinite ad superficiem visus, et erunt decli-
 nantes super ipsam. Punctum ergo superficiei glacialis ex quo
 exit perpendicularis super superficiem visus et pertransit fora-
 men uvee, exeunt ab eo lineae infinite que transeunt in foramen
 uvee, et perveniunt ad superficiem visus, preter illum perpen-
 275 dicularem.

[6.22] Et extremitates omnium linearum exeuntium a punc-
 to aliquo superficiei glacialis et transeuntium per foramen uvee
 et pervenientium ad superficiem visus et declinantium super
 illam, quando fuerint ymagnate reflecti secundum modum
 280 quem affirmat diversitas diafonitatis que est inter diafoni-
 tatem corporis corneae et diafonitatem aeris, perveniunt ad
 diversa loca et ad puncta diversa de numero punctorum que
 sunt in superficiebus visibilium oppositorum visui in uno
 tempore. Et nulla istarum linearum occurrit puncto quod est
 285 apud extremitatem perpendicularis. Et forme punctorum que
 sunt apud extremitates omnium istarum linearum superfici-
 erum visibilium extenduntur secundum rectitudinem istarum
 linearum, et perveniunt ad superficiem visus, et reflectuntur ad
 idem punctum superficiei glacialis, preter formam puncti quod
 290 est apud extremitatem perpendicularis, quoniam ipsa extend-
 itur secundum rectitudinem perpendicularis et pertransit ad

260 *post omnium*¹ *scr. et del.* visibilium P1 261 illo: illorum EP3 263 punctus:
 punctum P3/qui: quod R 265 residuorum reflectuntur: reliquorum refringuntur
 R/illud: illum P15 267 super: ad EP3R 268 etiam *om.* EP3R 270 exeunt
 ex eo: ab eo exeunt R/ex eo *om.* EP3/erunt: sunt R 271 punctum: a puncto R
 273 ab eo *om.* R 274 illum: illam R 276 extremitates *corr.* ex extremitas a. m. S/
post a scr. et del. puncto P3 279 illam: ipsam Er/yimaginatē reflecti: intellectae
 refringi R 281 corporis *rep.* P1/diafonitatem *om.* P3R; *inter. a. m. E/ante* aeris *add.*
 corporis EP3R 282 diversa loca *transp.* P1 284 occurrit *corr.* ex occidit E
 288 *post et*¹ *scr. et del.* pere P3/ante visus *scr. et del.* s Er/reflectuntur: refringuntur R
 289 *post* superficiei *scr. et del.* con Er

illud punctum glacialis. Si ergo glacialis sentit ex uno puncto
in eo omnes formas venientes ad ipsum ex omnibus verticati-
onibus, sentiet ex omni puncto formas admixtas ex multis
295 formis diversis et coloribus multis visibilium oppositorum visui
in illo tempore. Et sic nichil distinguetur ab eo ex punctis que
sunt in superficiebus visibilium nec ordinabuntur forme punc-
torum venientes ad illud punctum. Et si glacialis senserit ex
uno puncto eius illud quod venit ad ipsum ex una verticatione
300 tantum, distinguentur ab eo puncta que sunt in superficiebus
visibilium.

[6.23] Et nullum punctorum quorum forme perveniunt ad
glacialem super lineas reflexas est dignius alio ex formis reflex-
is, nec ulla verticatio reflexa est dignior alia; et forme reflexe
5 ad unum punctum glacialis in uno tempore sunt multe, non
determinate. Et punctum cuius forma venit secundum recti-
tudinem perpendicularis ad unum punctum glacialis fuit unum
punctum tantum; et nulla alia forma venit cum ea secundum
rectitudinem perpendicularis, quoniam omnes forme reflexe
10 non reflectuntur nisi secundum lineas declinantes. Et etiam
cum centrum superficiei visus sit idem cum centro superficiei
glacialis, linea que est perpendicularis super superficiem visus
est perpendicularis super superficiem glacialis. Forma ergo
que venit super perpendicularem distinguitur ab aliis formis
15 duabus dispositionibus quarum altera est quod ipsa extendi-
tur a superficie rei vise ad punctum glacialis super lineam rec-
tam, et residue veniunt super lineas reflexas. Altera autem est
quod ipsa perpendicularis erecta super superficiem visus est
perpendicularis super superficiem glacialis etiam, et lineae re-
20 sidue super quas veniunt forme residue reflexe sunt declinan-
tes super superficiem glacialis, quoniam sunt declinantes super
superficiem visus.

293 in eo om. R/post eo scr. et del. quod P1 294 sentiet corr. ex sentiat E 295 et:
ex EErP3 297 ante in scr. et del. ex P1 298 et: at R 299 puncto eius: sui puncto
R/post ad scr. et del. punctum S/ipsam: ipsam Er 300 distinguentur: distingue-
tur Er 3 reflexas: refractas R/reflexis (4): refractis R 4 ulla: illa S/verticatio
reflexa transp. EP3R/reflexa: refracta R/dignior corr. ex dignor P3/reflexe: refractae R
5 non inter. a. m. S 7 ad . . . perpendicularis (9) mg. a. m. E/fuit: est R 9 reflexe:
refractae R; corr. ex rex P3 10 non reflectuntur om. P3/reflectuntur: refringuntur R/
etiam om. P1R 12 ante glacialis scr. et del. visus S/ante super add. ad unum punctum
glacialis P1S 15 dispositionibus: disputationibus P1; corr. ex disputationibus S/
ipsa om. P1 17 post lineas scr. et del. rectas Er/reflexas: refractas R 18 ipsa: ista
Er/erecta: recta Er/erecta . . . superficiem corr. ex super . . . erecta Er/est . . . superficiem
(19) om. P1/post est add. etiam R 19 etiam om. RS/residue (20) corr. ex residuee S
20 reflexe: refractae R/post sunt add. super P3 21 glacialis . . . superficiem (22) om.
R; mg. a. m. E

[6.24] Et operatio lucis venientis super perpendiculares est
 25 fortior operatione lucis venientis super lineas inclinatas. Dig-
 nius ergo est ut glacialis non sentiat ex quolibet puncto nisi
 formam venientem ad ipsum secundum rectitudinem perpen-
 dicularis tantum, et non sentiat ex illo puncto illud quod venit
 ad illud punctum secundum verticationes reflexas.

[6.25] Et etiam cum centrum superficiei visus et centrum
 30 superficiei glacialis sit idem punctum, omnes perpendiculares
 elevate super superficiem glacialis et superficiem visus concur-
 runt super centrum commune, et erunt dyametri in superficie-
 bus tunicarum visus. Et erit quelibet perpendicularis occurrens
 superficiei corneae in uno puncto et occurrens superficiei glaci-
 35 alis in uno puncto, et non exit ad illud punctum corneae nisi una
 perpendicularis tantum, nec exit ad illud punctum glacialis nisi
 illa perpendicularis tantum. Forma ergo que exit ex quolibet
 puncto superficiei rei vise super perpendicularem que extendi-
 tur ab eo ad superficiem visus occurrit superficiei visus super
 40 unum punctum super quod non occurrit ei aliqua alia forma-
 rum venientium non super perpendiculares. Et etiam iam
 declaratum est quod ex quolibet puncto cuiuslibet corporis
 colorati et illuminati cum quolibet lumine exeunt lux et color
 super quamlibet lineam rectam que poterit extendi ab illo
 45 puncto.

[6.26] Inter ergo quodlibet punctum oppositum alicui su-
 perficiei et quodlibet punctum illius superficiei est linea recta
 ymaginabilis, et inter illud punctum et totam illam superficiem
 est piramis ymaginabilis cuius conus est illud punctum et cuius
 50 basis est illa superficies. Et illa piramis continet omnes lineas
 rectas ymaginatas que sunt inter illud punctum et omnia puncta
 illius superficiei.

[6.27] Cum ergo forma lucis et coloris exierint a quolibet
 puncto superficiei corporis colorati illuminati super quamlibet

24 inclinatas corr. ex declinantes P3 26 post ipsum add. punctum R/secundum:
 super R/post rectitudinem scr. et del. glacialis P1 27 sentiat: sentit P15/illud
 om. P1S 28 reflexas: refractas R 29 etiam: iterum R 31 post et add. su-
 per Er 32 super: apud Er 33 post visus add. perpendiculares super ipsas tunicas
 visus R 35 illud: istud S 36 tantum om. R/nisi corr. ex ubi S 37 illa: ipsa
 EP3; una R/post illa add. ipsa Er/ex: a R; corr. ex aq S 40 non . . . ei: ei . . . occurrit
 EP3R/aliam: forma Er/formarum (41): forma E 41 venientium non transp. R/non
 om. S/perpendiculares: perpendicularem P3/etiam: iterum R; om. P1S 42 declara-
 tum: determinatum P1RS/quod om. Er 46 inter ergo transp. R/post punctum add.
 visus et quodlibet punctum EP1P3R (post punctum scr. et del. totum E)/superficiei (47)
 om. ES 48 totam om. EP3R 49 conus: vertex R 50 est rep. P3 51 ymagi-
 natas: intellectas R

55 lineam rectam que poterit extendi ab illo puncto ad quodlibet
punctum oppositum corpori illuminato et colorato, forma lucis
et coloris que sunt in superficie illius corporis extenditur a
quolibet puncto superficiei illius corporis ad illud punctum
60 oppositum illi super lineam rectam extensam inter ipsum cor-
pus et illud punctum. Forma ergo lucis et coloris cuiuslibet
corporis colorati et illuminati cum quolibet lumine extenditur a
sua superficie ad quodlibet punctum oppositum illi superficiei
secundum verticationem pyramidis que formatur inter illud
punctum et illam superficiem. Et erit forma ordinata in illa
65 piramide per illas lineas concurrentes ad illud punctum qui est
conus pyramidis sicut est ordinatio in partibus coloris qui est
in superficie illius corporis.

[6.28] Cum ergo fuerit visus oppositus alicui rei visibili,
formabitur inter punctum qui est centrum visus et superficiem
70 illius rei vise pyramis ymaginata cuius conus erit centrum visus
et basis erit superficies illius rei vise. Et cum aer medians inter
illam rem visam et visum fuerit continuus, et non fuerit medi-
um inter rem visam et visum corpus densum, et fuerit illa res
visa illuminata cum quolibet lumine, erit forma lucis et coloris
75 que sunt in superficie illius rei vise extensa ad visum secundum
verticationem illius pyramidis. Et erit forma cuiuslibet puncti
superficiei illius rei vise extensa secundum rectitudinem linee
que est inter illud punctum et conum pyramidis quod est cen-
trum visus.

80 [6.29] Et quia centrum visus idem est cum centro super-
ficiei glacialis, erunt omnes iste linee perpendiculares super
superficiem manifesti oculi, et super superficiem glacialis, et
super omnes superficies visus equidistantes. Et erit pyramis
continua super omnes istas perpendiculares continens omnes
85 istas perpendiculares et aerem in quo extenditur forma a tota

56 *post oppositum scr. et del. illi P1* 57 *extenditur: extendetur R/post extenditur scr. et del. cum E/ante a add. forma EErP3* 58 *punctum oppositum (59) corr. ex oppositum punctum P3* 59 *corpus (60) om. Er* 61 *colorati corr. ex coloratis P3*
62 *sua superficie transp. P1* 64 *post superficiem scr. et del. super Er* 65 *illas om. Er/illas lineas transp. R/qui: quod EP3R* 66 *conus: corpus P3; vertex R* 67 *illius corporis corr. ex corporis illius Er/corporis: coloris P3* 68 *cum: qui P1/fuerit visus transp. ErR* 69 *qui: que P1; quod RS* 70 *ymaginata: imaginabilis R/conus: vertex R* 71 *cum aer corr. ex aer cum S/medians: medius R* 72 *continuus corr. ex continuans P1* 73 *visum: visus S/illa rep. P3* 74 *erit: extendetur R*
75 *extensa om. R* 76 *erit: extendetur R* 77 *extensa om. R/post secundum scr. et del. verticationem vel E* 78 *illud: istud S/conum: verticem R/post conum add. illius EP3R/quod: qui EP3R/post est² add. inter EP3 (scr. et del. E)* 80 *quia om. EErP3/post centro scr. et del. glaciei P1* 81 *iste: ille Er* 82 *manifesti om. R/super om. R* 83 *superficies corr. ex superficicies P3* 85 *a: si Er*

superficie illius rei vise opposite visui secundum verticationes
 perpendicularium. Et erit superficies glacialis secans istam
 piramidem, et sic pervenit forma lucis et coloris que sunt in
 superficie illius rei vise in partem superficiei glacialis quam
 90 distinguit piramis. Et ad quodlibet punctum istius partis su-
 perficiei glacialis veniet forma puncti oppositi superficiei rei
 vise secundum rectitudinem perpendicularis exeuntis ab illo
 puncto superficiei rei vise super superficies tunicarum visus et
 super superficiem glacialis. Et pertransit diafonitatem tunica-
 95 rum visus secundum rectitudinem illius perpendicularis, et non
 pertransit cum illa forma secundum rectitudinem illius perpen-
 dicularis alia forma. Et erit ista forma perveniens ad istam
 partem glacialis ordinata in ea secundum lineas super quas
 pervenit ad ipsam que sunt perpendiculares ad ipsam et con-
 100 currentes apud centrum visus sicut ordinatio partium super-
 ficiei rei vise. Et cum hoc veniunt in illa dispositione ad quod
 libet punctum huius partis superficiei glacialis multe forme a
 multis punctis superficierum visarum in eodem tempore. Per-
 veniunt ergo in ista parte superficiei glacialis que distingueba-
 105 tur a piramide multe forme ex multis coloribus diversis.

[6.30] Si ergo glacialis senserit ex parte distincta per pira-
 midem formam venientem ad ipsam ex verticatione illius pira-
 midis tantum, nec non senserit ex illa parte sue superficiei ali-
 am formam nisi formam venientem super illam verticationem,
 110 sentiet formam illius rei secundum suum esse, et sentiet ordi-
 natam secundum suam ordinationem. Et poterit etiam sentire
 in illa dispositione formas aliarum rerum visarum, preter illam
 rem visam, ex pyramidibus distinguantibus ex sua superficie
 alias partes ab illa parte, et poterit sentire formam cuiuslibet
 115 illarum rerum visarum secundum suum esse et sentire situs ea-

87 erit *om.* R/secans: secabit R 88 lucis *corr.* ex luci P3 89 glacialis *om.* R/post
 quam *add.* comprehendit vel EP3 90 distinguit: comprehendit R/ante et scr. et del.
 et ad quodlibet punctum istius partis superficiei glacialis quam distinguit piramis Er/
 partis *om.* EP3R 92 ab: ob P1/illo: isto EP3R 93 superficies: superficiem R
 94 pertransit: pertransibit R 95 visus *om.* P1S/non . . . forma (96): cum illa forma
 non pertransit S 96 pertransit: pertransibit R 97 et . . . forma *om.* P3/erit *om.*
 R/perveniens: perveniet R 98 post lineas *add.* rectas EP3R 99 post ipsam¹ inter.
 vel ipsum a. m. E/que . . . ipsam *om.* Er 101 rei vise *corr.* ex vise rei P1/et cum hoc:
 praeterea R 104 ista *rep.* P1/ista parte: istam partem R/distinguebatur (105):
 distinguetur Er 106 post parte *add.* diversa P1S 107 ipsam: se R/illius:
 ipsius Er 108 non *om.* P1R/sue *om.* P1 109 nisi formam *om.* P1 110 sentiet²
corr. ex senten E 111 poterit *corr.* ex potuit a. m. E 112 ante rerum *add.* partium
 P1/ rerum visarum *transp.* P3 113 pyramidibus *corr.* ex piramide P1 114 poterit:
 potuit EP3 115 illarum *om.* R/illarum rerum *transp.* EP3

rum adinvicem secundum suum esse.

[6.31] Et si glacialis senserit formas venientes ad ipsam ex
 verticationibus reflexis, sentiet ex eadem parte que distingue-
 batur ex sua superficie per illam piramidem formas admixtas
 120 ex formis partium illius rei vise et ex formis multarum rerum
 visarum diversarum, et erunt admixte ex multis coloribus di-
 versis. Et sentiet ex qualibet parte sue superficiei, preter illam
 partem, formam admixtam ex formis multarum rerum visarum
 diversarum, et sic non sentiet formam venientem secundum
 125 piramidis verticationem secundum suum esse, nec aliquam
 formarum venientium super perpendiculares secundum suum
 esse, nec aliquam formarum venientium ex verticationibus re-
 flexis. Non sentiet ergo formam unius rei vise secundum suum
 esse, nec distinguuntur ab ea res vise opposite illi in eodem
 130 tempore.

[6.32] Sed visus comprehendet res visas distinctas, et
 comprehendet partes unius rei vise ordinatas secundum suum
 esse in superficie rei vise, et comprehendet res visas multas
 simul in eodem tempore. Et cum visio est ex formis venienti-
 135 bus ex rebus visis ad visum, nichil sentiet glacialis ex formis
 rerum visarum ex verticationibus reflexis.

[6.33] Et etiam nulla formarum pervenientium ad super-
 ficiem glacialis ex formis rerum visarum ordinabitur in super-
 ficie glacialis secundum suum esse, nec ulla formarum partium
 140 unius rei vise pervenientium ad superficiem glacialis ordinabi-
 tur in superficie glacialis secundum suum esse in superficie rei
 vise nisi forme pervenientes ad eam secundum rectitudinem
 perpendicularium elevatarum super superficiem visus tantum.
 Situs autem formarum reflexarum apud superficiem visus eti-
 145 am perveniunt in superficiem glacialis conversi. Et pervenit
 forma unius puncti cum hoc in portione superficiei glacialis,

116 adinvicem: inter se R 117 ipsam: se R 121 visarum *om.* P1/visarum
 diversarum *transp.* S 123 admixtam: permixtam R/visarum *om.* R/visarum
 diversarum (124) *transp.* S 124 diversarum *om.* P1 125 piramidis *corr.* ex
 piramidem P1 126 formarum: formam EP3R/venientium: venientem R/perpen-
 diculares: perpendicularem R 127 formarum: formam EP3R/venientium: ve-
 nientem R/reflexis (128): refractis R 131 comprehendet: comprehendit EP1P3R/
 res *om.* S 132 comprehendet: comprehendit R/suum esse (133) *transp.* EP3
 133 comprehendet: comprehendit PIRS 134 visio: viso Er/est: sit R 136 ante
 ex scr. et del. i Er/reflexis: refractis R 137 etiam: sic EP3R/formarum: forma EP3
 139 nec . . . esse (141) *om.* Er/formarum: forma EP3 140 ordinabitur (141) . . .
 glacialis (141) *om.* P1 142 pervenientes: pervenientis P3/eam: eas S
 143 perpendicularium: perpendicularem Er 144 reflexarum: refractarum R/etiam
 (145) *om.* Er; *corr.* ex et a. m. E 146 ante forma *add.* insuper R/cum hoc *om.* R/
 portione: portionem R

non in uno puncto, et illud est quia forma puncti dextri apud visum, quando extendetur ad punctum superficiei visus, et fuerit linea super quam extendetur forma declinans super superficiem visus, reflectetur ad partem sinistram a perpendiculari que extenditur a centro visus ad illud punctum sue superficiei. Et pervenit forma que reflectitur ab extremitate perpendicularis secundum hunc modum ad punctum sinistram a puncto superficiei glacialis super quod abscondit illam illa perpendicularis. Et similiter forma puncti sinistri a visu que extenditur ad illud idem punctum superficiei visus et declinat super ipsam reflectetur ad punctum dextrum a perpendiculari et a puncto superficiei glacialis quod est super illam perpendicularem. Quoniam forme reflexe non appropinquant post reflexionem perpendiculari exeunti a loco reflexionis, et non perveniunt per applicationem forme perpendiculari, nec pertranseunt ipsam nec procedunt, quoniam hec est proprietas formarum reflexarum.

[[6.34] Et similiter forme duorum punctorum que sunt in eadem parte a visu que exeunt ad unum punctum superficiei visus et declinant super ipsam in eadem parte perveniunt in superficie glacialis converse, quoniam due linee super quas extenduntur due forme punctorum secant se ad punctum superficiei visus super quod concurrunt due forme, et occurrunt perpendiculari exeunti ad illud punctum superficiei visus super illud punctum. Cum ergo iste due linee fuerint declinantes a superficie visus in eadem parte a perpendiculari exeunti a centro visus ad illud punctum, reflectuntur forme duorum punctorum ad partem oppositam illi parti. Et etiam quia due linee super quas extenduntur due forme ad unum punctum superficiei visus secant se super illud punctum, oportet quod,

147 uno puncto: unum punctum R/quia: quod EErP3R 148 ad: apud P3/punctum
 corr. ex visum P3 149 fuerit om. R/declinans: obliqua R 150 reflectetur:
 refringetur R; corr. ex extendetur P3 151 extenditur: extendetur EP3R 152 post
 que scr. et del. ex P1/reflectitur: refringitur R 154 superficiei glacialis transp. EP3R/
 abscondit Er 155 extenditur (156): extendetur R 157 reflectetur:
 reflectitur EP3; refringetur R 159 reflexe: refractae R/non om. Er 160 reflexi-
 onem: refractionem R/reflexionis: refractionis R/non inter. a. m. S 161 per: ad Er/
 perpendiculari: ad perpendicularem R/post nec add. post reflexionem EP3; add. post
 refractionem R 162 post ipsam add. post reflexionem P1/procedunt: precedunt
 EErRS/hec: hic S 163 formarum: forma P1/reflexarum: refractarum R; corr. ex
 reflexia P1 167 superficiei: superficiem R 168 ante due scr. et del. duorum
 punctorum P3/punctorum: puncti Er/ad: apud Er 169 post et scr. et del. conti P1/
 occurrunt lac. Er 173 reflectuntur: refringuntur R 174 partem: punctum EP3R/
 oppositam: oppositum EP3R/ante illi scr. et del. in eadem parte a perpendiculari Er/
 etiam quia transp. P3/quia inter. E 175 extenduntur: extendentur P1 176 secant
 om. P3/quod om. R

quando extenduntur secundum suam rectitudinem post sectionem, ut appareat situs eorum conversus in respectu eius qui est in re visa et etiam respectu perpendicularis. Et efficitur
 180 linea que erat dextra ante suam perventionem ad superficiem visus ex illis duabus lineis sinistra post suum pertransitum in superficie visus et sinistra dextra.

[6.35] Et similiter erit situs duarum linearum super quas reflectentur due forme ex uno puncto superficie visus, quoniam
 185 am due forme que reflectuntur ex uno puncto appropinquant ambo perpendiculari, et extenditur forma que erat super lineam remotiorem a perpendiculari post sectionem super lineam remotiorem etiam a perpendiculari, sed minoris remotionis quam linea super quam erat. Et extenditur forma que erat
 190 super lineam propinquiorem perpendiculari etiam post sectionem super lineam propinquiorem perpendiculari etiam, sed maioris propinquitatis quam linea super quam erat, et similiter omnes forme que reflectuntur ab uno puncto.

[6.36] Et cum hoc fuerit experimentatum experimentatione subtili, invenietur secundum quod diximus. Et nos ostendemus
 195 viam per quam experimentabitur hoc experimentatione vera apud nostrum sermonem in reflexione, et tunc discooperientur omnia dependentia a reflexione. Et nos non utemur illic in declaratione rerum quibus usi fuimus in isto tractatu ex illis
 200 que declaravimus in isto tractatu per istas res.

[6.37] Duo ergo puncta declinantia ad unam partem a re visa, quando forme eorum extenduntur ad unum punctum superficie visus, secabunt se super duas lineas quarum situs erit
 205 apud visum in respectu rei vise econverso a situ duarum linearum primarum super quas extendebantur due forme ad superficiem visus. Erit ergo situs duorum punctorum superficie

178 appareat *corr. ex apparet E* 179 etiam respectu *transp. EP3R/respectu inter. a. m. E* 181 ex . . . visus (182) *mg. a. m. S/illis . . . lineis: lineis . . . duabus EP3/pertransitum corr. ex transitum E* 184 reflectentur: refringetur R; *corr. ex refel P3/*
due corr. ex de a. m. S 185 que reflectuntur *inter. a. m. S/reflectuntur: refringuntur R* 186 forma *inter. a. m. E* 187 ante post *scr. et del. sed minoris S* 188 remotiorem: propinquiorem *Er/minoris: maioris Er* 190 propinquiorem *om. P1/perpendiculari corr. ex perpendiculararem P1/etiam om. P1/sectionem (191) corr. ex lineam P3* 191 propinquiorem *om. P1/perpendiculari etiam transp. R/ante etiam scr. et del. et S/sed: si Er* 194 hoc *om. EP3R/experimentatione: experimentum P3*
 196 experimentabitur hoc *om. P3* 197 in reflexione: de refractione *R/ante et scr. et del. vera P3* 198 reflexione: refractione *R/nos corr. ex no S/illic: illi S* 199 declaratione: demonstratione *P1R; declinatione S/rerum: rebus R/usi corr. ex nisi S/ex . . . tractatu (200) mg. a. m. S/ex . . . res (200) om. R* 204 econverso: econtrario *EErP3S; contrarius R/a situ: situi R*

glacialis ad que perveniunt due forme econtrario situi duorum punctorum ex quibus veniunt due forme. Omnes ergo forme que reflectuntur ab uno puncto superficiei visus perveniunt in
210 superficiei glacialis converse.

[6.38] Et etiam forma cuiuslibet puncti oppositi visui venit ad totam superficiem visus; igitur reflectetur a tota superficie visus. Et forma que reflectitur a tota superficie visus reflectitur ad partem alicuius quantitatis superficiei glacialis, non ad
215 unum punctum, quoniam forme reflexionis, si concurrerint post reflexionem super unum punctum, secarent perpendiculares apud quarum extremitates reflectebantur, aut pertransirent ipsas, aut exiret forma a superficie in qua reflectebatur. Sed nulla forma reflexa occurrit perpendiculari apud cuius extremitatem fuit reflexa post reflexionem, nec pertransit illam, nec exit a superficie in qua fuit reflexa. Et omnia ista manifestantur apud experimentationem. Forma ergo unius puncti rei vise que pervenit in superficie glacialis per reflexionem non erit in uno puncto sed in parte alicuius quantitatis superficiei glacialis.
225 Et non erit situs formarum punctorum diversorum superficiei rei vise que perveniunt in superficie glacialis per reflexionem adinvicem sicut situs earum secundum suum esse in superficiebus rerum visarum, sed econtrario. Nulla ergo formarum reflexarum rerum visarum pervenientium ad superficiem glacialis est secundum suum esse in superficiebus rerum visarum.
230 Et iam declaratum est quod forme venientes super perpendiculares ordinantur in superficie glacialis secundum suum esse, quoniam extenduntur recte a superficiebus rerum visarum ad superficiem glacialis. Nulla ergo formarum rerum visarum venientium ad superficiem glacialis ordinatur in superficie
235

209 reflectuntur: refringuntur R 210 superficiei: superficiem R 211 etiam: iterum R 212 igitur reflectetur: ergo refringetur R 213 reflectitur¹: reflectetur Er; refringitur R/reflectitur (214): refringitur R; reflectetur S 215 post punctum scr. et del. ?? Er/reflexionis: refractionis R/concurrerint: concurrerent R 216 reflexionem: refractionem R 217 reflectebantur: reflectabantur P1S; refringebantur R/pertransirent corr. ex pertransierent S 218 reflectebatur: reflectabatur E; refringebatur R 219 reflexa: refracta R/occurrit: concurret P1; corr. ex accidit a. m. E; corr. ex concurret a. m. S 220 fuit: fuerit EP3R/reflexa: refracta R/post . . . reflexa (221) mg. a. m. S/reflexionem: refractionem R 221 exit: erit P1/reflexa: refracta R/manifstantur (222): mani P1 222 apud: per R/ergo: igitur P1 223 per: post R 225 post formarum add. rerum diversarum vel EP3R/superficiei (226): superfici-erum P3 226 perveniunt: veniunt P1S/superficie: superficiem R/reflexionem (227): refractionem R 227 adinvicem: inter se R/situs corr. ex. finis a. m. E 228 sed . . . visarum (230/231) mg. a. m. E/econtrario: contrarius R 229 reflexarum: refractarum R; om. Er 234 post glacialis add. et (231) . . . glacialis (234) Er (om. super/quoniam: quia/om. recte/om. rerum); scr. et del. et (231) . . . glacialis (232) E 235 venientium: pervenientium Er

glacialis secundum suum esse in superficiebus rerum visarum nisi forme extense super verticationes perpendicularium tantum.

[6.39] Si ergo sensus rerum visarum sit ex formis venientibus ad ipsum ex superficiebus rerum visarum, nichil comprehendet visus ex formis rerum visarum pervenientium ad ipsum nisi ex verticationibus linearum quarum extremitates concurrunt apud centrum visus tantum, quoniam visus nichil comprehendit ex formis rerum visarum nisi ordinatum secundum suum esse in superficiebus rerum visarum.

[6.40] Et etiam cum centrum superficiei visus non est centrum superficiei glacialis, lineae recte quae exeunt a centro superficiei visus, et extenduntur in foramine uveae, et perveniunt ad res visas non erunt perpendiculares super superficiem glacialis sed declinantes super ipsam; nec situs earum super superficiem glacialis erunt situs consimiles nisi una linea tantum, et est quae transit per duo centra. Formas ergo venientes a superficiebus rerum visarum ad superficiem glacialis non potest sentire glacialis nisi ex verticationibus istarum linearum tantum—scilicet quae sunt perpendiculares super superficiem visus quae est superficies corneae. Quoniam forme quae sunt super istas perpendiculares tantum sunt ordinate in superficie glacialis secundum ordinationem earum in superficiebus rerum visarum.

[6.41] Si ergo glacialis comprehendat res visas ex formis venientibus ad ipsam et non comprehendat formam nisi ex verticationibus istarum linearum, et istae lineae non sunt perpendiculares super superficiem eius, comprehendet tunc formas ex verticationibus quarum situs a sua superficie sunt diversi situs et declinantes super suam superficiem. Et comprehendit formas ex verticationibus diversorum situum declinantibus, et comprehendit omnes formas reflexas ex verticationibus diver-

236 *post esse add. quod habent EP3R/post rerum scr. et del. rerum S* 237 *extense:*
extente P3 240 *ad ipsum inter. a. m. S/ipsam: ipsam Er* 241 *pervenientium:*
pervenientibus R/ipsam: ipsam Er 242 *linearum om. EP3R* 244 *post ex scr. et*
del. ex Er/ordinatum: ordinatarum P3 246 *etiam: iterum R; om. EP3/cum: si R*
248 *in inter. a. m. S* 249 *erunt om. S* 250 *post super¹ scr. et del. superficiem*
glacialis (251) P1 251 *post nisi add. in Er/una inter. a. m. S/et est: scilicet R*
252 *post duo scr. et del. for P1* 253 *sentire corr. ex seire Er* 255 *ante super scr. et*
del. super P1 256 *istas perpendiculares (257): istam perpendicularem EP3*
258 *earum: eorum P3* 259 *glacialis mg. a. m. E/comprehendat: comprehendit EP3R*
260 *ipsam: ipsum P3S; se R/comprehendat: comprehendit EP3R* 261 *post iste scr.*
et del. no S/post non scr. et del. I E/sunt: sint Er 263 *sua superficie transp. EP3R*
264 *comprehendit: comprehendet R* 265 *et om. Er* 266 *reflexas: refractas R*

sorum situum apud suam superficiem. Et si comprehendisset omnes formas reflexas ex verticationibus diversorum situum, nichil distinguetur ab ea ex rebus visis, propter hoc quod declaratum est superius. Et cum non est possibile ut comprehendat formas reflexas ex verticationibus diversorum situum, non est possibile ut comprehendat formas rerum visarum ex verticationibus linearum que sunt perpendiculares super superficiem visus nisi quando linee iste fuerint perpendiculares super superficiem eius et fuerint situs eorum in superficie eius con-

270
275
280

similes. Et iste linee non erunt perpendiculares super superficiem suam nisi quando centrum sue superficiei et centrum superficiei visus fuerint idem punctum. Si ergo sensus visus rerum visarum est ex formis venientibus ad ipsum ex coloribus rerum visarum et lucibus earum, oportet ut centrum superficiei visus et centrum superficiei glacialis sit unum punctum commune, et nichil comprehendat visus ex formis rerum visarum nisi ex verticationibus linearum rectarum quarum extremitates concurrunt apud istud centrum tantum.

285 [6.42] Et non est impossibile ut duo centra sint idem, quoniam iam declaratum est quod duo centra sunt ex posteriori centro uvee et sunt super unam lineam rectam transeuntem per omnia centra. Et cum non est impossibile ut duo centra sint idem et ut linee recte que exeunt a centris sint perpendiculares

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super duas superficies—scilicet super superficiem glacialis et superficiem visus—non est etiam impossibile ut sit comprehensio visus rerum visarum ex formis venientibus ad ipsum coloris et lucis que sunt in superficie rerum visarum, cum comprehensio istarum formarum sit ex verticationibus perpendicularium tantum. Et illud est ut natura visus sit recipiens ea que

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veniunt ad ipsum ex formis rerum visarum, et etiam ut sit na-

267 comprehendisset: comprehendit R 268 omnes om. EErP3/reflexas: refractas R/diversorum: duorum EP3 269 distinguetur: distingueretur Er/ea: eo R 270 est¹: fuit EErP3R/est²: sit R 271 reflexas: refractas R/reflexas . . . formas (272) om. Er 273 linearum que sunt corr. ex que sunt linearum E 274 linee iste transp. Er/iste: ille EP3; om. R/perpendiculares om. EP3 275 fuerint: fiunt P1S/eius² om. EP3R/post eius² add. et . . . eius² P1 (fuerint: fiunt) 278 visus² om. Er 279 est . . . visarum (280) om. Er; scr. et del. S 280 ante et scr. et del. est S/post earum add. et hoc distincte EP3R 283 verticationibus corr. ex verticatione P1/linearum rectarum transp. R 284 ante istud add. unum et R/istud centrum: idem punctum EP3R 285 post et add. tamen EP3/sint corr. ex sunt S/quoniam (286) . . . idem (289) mg. a. m. E 286 iam om. R 287 sunt om. EErP3R 288 cum: quoniam EP3R/sint corr. ex sunt S 289 sint: sunt P1 290 duas om. Er/duas superficies transp. P3/super² om. Er 291 est om. EP3/impossibile corr. ex possibile S 293 coloris et lucis: lucis et coloris R 294 istarum formarum transp. R 295 natura: non P3/sit recipiens: recipiat R 296 ipsum: ipsam ErP1; se R; corr. ex ipsam P3

tura visus cum hoc appropriata ut non recipiat ea que veniunt
ad ipsum ex formis nisi ex propriis verticationibus, non ex om-
nibus verticationibus; et sunt verticationes linearum rectarum
300 quarum extremitates concurrunt apud centrum visus tantum,
et iste linee appropinquantur in centro quia sunt dyametri (ei-
us visus scilicet) et perpendiculares super superficiem sentien-
tis. Et sic erit sensus ex formis venientibus ex rebus visis, et
erunt iste linee quasi instrumentum visus per quod distinguen-
5 tur a visu res vise et per quod ordinabuntur partes cuiuslibet
rerum visarum.

[6.43] Et quod esse visus appropriatur aliquibus verticati-
onibus tantum habet similia in rebus naturalibus. Quoniam lux
oritur ex corporibus luminosis, et extenditur super verticatio-
10 nes rectas tantum, et non extenditur super lineas arcuales aut
curvas; et corpora ponderosa moventur ad inferius motu na-
turali super lineas rectas, non super lineas curvas aut arcuales
aut tortuosas. Et non movebuntur super omnes lineas rectas
que sunt inter eas et superficiem terre, sed super lineas rectas
15 proprias que sunt perpendiculares super superficiem terre et
dyametrum terre. Et corpora celestia moventur super lineas
spericas et non super lineas rectas nec super lineas diversi or-
dinis. Et cum fuerimus intuentes motus naturales, inuenimus
quod quilibet eorum est appropriatus aliquibus verticationi-
20 bus. Non est ergo impossibile ut sit visus appropriatus in re-
ceptione operationum lucis et coloris aliquibus verticationibus
rectis que concurrunt apud eius centrum tantum, et sunt super
perpendiculares super superficiem eius. Comprehensio autem
visus de rebus visis ex verticationibus linearum rectarum qua-
25 rum extremitates concurrunt apud centrum visus est conces-
sum a mathematicis, et nulla diversitas est inter eos in hoc. Et
iste linee vocantur ab eis linee radiales.

[6.44] Et cum hoc sit possibile, et forme lucis et coloris

297 cum hoc: insuper R 298 ipsum: se R/ex² om. EP3 300 visus om. EP3/post
tantum mg. vel visus a. m. E 1 in centro om. S/quia: quoniam Er 2 post
superficiem add. visus P1R (scr. et del. P1) 5 ante partes add. a visu EP3R 7 quod
om. P1S/appropriatur: appropinquatur EP3; appropriantur Er 8 tantum:
quoniam P1S 11 curvas: tortuosas R 12 non . . . rectas (13) mg. a. m. S
13 et non: nec tamen R 14 sed . . . terre (15) om. S/post rectas add. et P1 16 terre:
eius EP3 17 spericas . . . lineas¹ om. P1 18 intuentes: intuiti R 19 ante
aliquibus scr. et del. visui P1 20 ante non add. tantum R/est om. P3 22 rectis corr.
ex erectis Er/super om. EP3R 24 ante visus scr. et del. eius Er/ex corr. ex de a. m. S
25 concessum (26): concessa R 27 vocantur om. P1/linee² om. P1/radiales corr. ex
radices a. m. S

veniant ad visum et pertranseant per diafonitatem tunicarum
 30 visus, et visio non completur ex receptione istarum formarum
 nisi quando visus receperit istas ex verticationibus perpendi-
 cularium tantum, visus ergo non comprehendit luces et colores
 superficierum rerum visarum nisi ex formis venientibus ad ip-
 sum ex superficiebus rerum visarum. Et non comprehendit is-
 35 tas formas nisi ex verticationibus linearum rectarum quarum
 extremitates concurrunt apud centrum visus tantum.

[6.45] Aggregemus modo ea que possunt aggregari ex omni
 quod diximus.

[6.46] Et dicamus quod visus sentit lucem et colorem que
 40 sunt in superficie rei vise ex forma extensa et luce et colore que
 sunt in superficie rei vise per corpus diafonum quod est medi-
 um inter visum et rem visam, et nichil comprehendit visus ex
 formis rerum visarum nisi ex verticationibus linearum rectarum
 extensarum inter rem visam et centrum visus tantum. Et de-
 45 claratum est cum hoc quod hoc sit possibile et non impossibile.

[6.47] Nos vero exponemus questionem, dicendo quod vi-
 sio non potest esse nisi secundum hunc modum. Quoniam vi-
 sus, quando senserit rem visam postquam non sentiebat ip-
 sam, aliquid accidet ei quod non erat, et nichil accidet post-
 50 quam non erat prius nisi per aliquam causam. Et invenimus
 quod, quando fuerit visus oppositus rei vise, sentiet ipsam; et
 cum auferetur ab eius oppositione, non sentiet ipsam, et cum
 revertetur ad oppositionem, revertetur sensus. Et similiter
 invenimus visum, quando senserit rem visam deinde clauserit
 55 palpebras, quod sensus destruetur; et cum aperit palpebras et
 res visa fuerit in oppositione, revertetur sensus. Sed causa est
 illud quod, quando destruetur, destruetur causatum; et quan-

29 tunicarum visus (30) *corr. ex visus tunicarum E* 30 completur: compleatur RS;
 compleatur *alter. ex complectetur S/receptione corr. ex reptione a. m. S* 31 perpen-
 dicularium (32) *om. ER; mg. P3* 33 superficierum *om. R* 37 ante modo *add.*
 ergo EErP3R 39 et dicamus *om. P3/colorem. colores EP3R/que: qui E* 40 post
 et¹ *add. ex EP3R* 41 post vise *scr. et del. ex forma extensa E* 43 rerum *om. P1/*
 rectarum *om. R* 44 post visus *scr. et del. s P1/post et² add. cum ErP3* 45 cum *om.*
 EErP1P3S/cum hoc *om. R/hoc¹ om. P1S/hoc² om. P1; inter. a. m. S/et non impossibile*
om. P1R 46 post vero *add. modo EP3R/post questionem add. quare fiat visio*
secundum hunc modum EP3R (ante quare add. qua E; post qua scr. et del. queretur E/
hunc modum transp. R) 48 non *om. P3* 49 accidet¹: accidit R/post erat *add. prius*
P1R/accidet²: accidit ErS/postquam (50): post quod Er 50 per *om. Er*
 51 quando . . . visus: visus . . . fuerit R/fuerit visus *transp. Er* 53 sensus: visus R
 54 visum quando: quando visus R 55 destruetur: destruitur EP3R 56 fuerit
corr. ex fuerint P3/revertetur: convertetur P1S; revertitur R 57 destruetur¹: destrui-
 tur E

do revertitur, revertetur causatum. Causa ergo que facit con-
tingere rem visam in visu est res visa apud oppositionem suam
60 visui. Visus ergo non sentit rem visam nisi propter illud quod
facit rem visam contingere in visu apud suam oppositionem
visui.

[6.48] Et etiam visus non comprehendit rem visam nisi
quando corpus quod est medium inter ea fuerit diafonum.
65 Nam comprehensio visus de re visa ex posteriori aeris qui est
medius inter eos non est propter humiditatem aeris sed prop-
ter diafonitatem eius, quoniam si medius fuerit inter visum et
rem visam aliquis lapis aut aliud corpus diafonum quodcum-
que, etiam comprehendet tunc visus rem visam. Et erit com-
70 prehensio secundum diafonitatem corporis mediantis, et quan-
to corpus medium fuerit magis diafonum tanto magis erit sen-
sus visus de illa re visa manifestior. Et similiter quando fuerit
inter visum et rem visam aqua clara diafona, comprehendet
visus rem visam a posteriori aque; et si illa aqua fuerit intincta
75 aliqua tinctura forti ita quod destruat diafonitas, quamvis
remaneat in ea humiditas, tunc visus non comprehendet illam
rem visam que est in aqua.

[6.49] Declarabitur ergo ex istis dispositionibus quod visus
non completur nisi per diafonitatem corporis medii, non per
80 suam humiditatem. Illud ergo quod res visa operatur in visum
apud suam oppositionem contra illum ex quo est sensus non
completur nisi per diafonitatem corporis medii inter visum et
rem visam. Lux ergo et color rei vise non comprehenditur a
visu nisi ex aliquo quod sit ex illa luce et colore in visu, et illud
85 non accidit ex colore et luce in visu nisi quando corpus medi-
um inter visum et rem visam fuerit diafonum.

[6.50] Diafonitas autem non appropriatur alicui ex eis que
pendent ex luce et colore quo diversificetur a non diafonitate

58 *ante* revertitur *scr. et del.* re P1/revertitur: revertetur S/post revertitur *add.* causa R/
revertetur: revertitur EP3 59 visam: illam ErP3/apud . . . suam: quando opponi-
tur R 60 illud *corr.* ex illam S 61 rem: res EErP3R/visam: visa EErP3; visas R/
apud . . . oppositionem: quando scilicet opponuntur R 63 etiam: iterum R
64 quod *om.* P3 65 *post* re *scr. et del.* re P3 66 *post* medius *add.* punctus P1
67 *post* medius *add.* terminus P1/fuerit: fuit Er 68 aliquis . . . visam (69) *mg.*
a. m. S 69 etiam: et EEr; *om.* P3R 71 magis¹: maius Er/*ante* tanto *add.* in EP3/
magis² *om.* R 72 illa re visa: re illa EP3R 74 intincta: tincta R 76 com-
prehendet *corr.* ex comprehendent P3 77 visam . . . aqua: que est in aqua visam EP3
79 completur *corr.* ex complectetur S/*post* medii *add.* et R; *scr. et del.* inter visum et rem
visam E 80 suam *om.* R/*post* suam *scr. et del.* medi P3/humiditatem: diamidita-
tem Er 82 completur *corr.* ex complectetur S 83 comprehenditur: comprehen-
detur EErP3R 84 sit: fit EErP3 85 colore et luce: luce et colore EP3R
88 diversificetur *corr.* ex diversatur P1/a non: ante S/diafonitate: affonitatem Er

nisi quia forma lucis et coloris pertranseunt per diafonum, et
 90 non pertranseunt in non diafonum, et quia corpus diafonum
 recipit formam lucis et coloris et redit ipsam partibus opposi-
 tis luci et colori; corpus autem non diafonum non habet istam
 proprietatem. Et cum visus non sentit lucem et colorem que
 sunt in re visa nisi ex aliquo contingente ex luce et colore in
 95 visu, et illud non contingit in visu nisi quando corpus medium
 inter visum et rem visam fuerit diafonum, et corpus diafonum
 nullo appropriatur quo distinguatur a corpore non diafono ex
 eis que pendent a luce et colore nisi per receptionem formarum
 et colorum et reditionem eorum ad partes oppositas, et declar-
 100 atum est quod, visus quando fuerit oppositus rei vise, forma
 lucis et coloris que sunt in re visa redentur visui et perveniunt
 in superficie sentientis, visus ergo non sentit lucem et colorem
 rei vise nisi ex forma extensa per corpus diafonum inter rem
 visam et visum et ex re quam facit contingere res visa in visu
 105 apud suam oppositionem illi mediante corpore diafono.

[6.51] Et licet nobis dicere quod corpus diafonum recipit a
 visu aliquid et redit ipsum rei vise, et per continuationem istius
 rei inter visum et rem visam evenit sensus. Et hec est opinio
 ponentium radios.

110 [6.52] Ponatur ergo quod ita sit et quod radii exeant a visu
 et pertranseant per corpus diafonum pervenientes ad rem vi-
 sam, et per istos radios sit sensus. Et cum ita fuerit sensus,
 quero per istos radios aut redetur visui aliquid aut non rede-
 tur. Si vero sensus fuerit per radios, et non redunt visui ali-
 115 quid, visus nichil sentiet. Sed visus sentit rem visam, et cum
 sentit rem visam et non sentit nisi mediantibus radiis, isti ergo
 radii qui sentiunt rem visam redunt visui aliquid per quod vi-

89 pertranseunt: pertransit R 90 pertranseunt: pertransit R/in: per R; om. Er/post
 in inter. vel per a. m. E 91 post partibus scr. et del. coi S 92 luci: lucis P3
 93 cum: quia R 94 visa om. Er 95 post quando scr. et del. medius S
 97 appropriatur corr. ex propriatur a. m. S 100 quod inter. E/visus om. P1/visus
 quando transp. EP3R/forma: forme R 101 perveniunt: pervenient R
 102 superficie: superficiem R/colorem corr. ex clorem Er 104 et visum om. P3/visu:
 visum EP3 105 apud . . . oppositionem: dum opponitur R 106 recipit: respi-
 cit Er 107 rei inter. a. m. S 108 post rei add. visae R/hec: hoc P1/est om. P3
 109 radios om. P1/post radios add. exire a visu R 110 et om. EP3R/exeant corr. ex
 hexeant E 111 per: ad P1 112 sit: fiat R/cum inter. a. m. S/fuerit: fiat R/sensus²
 corr. ex sensus P3 113 post quero add. an R/aut¹ om. R; corr. ex autem S/redetur:
 reddatur R/visui . . . redetur (114) inter. a. m. S/redetur (114): reduntur Er; reddatur R
 114 fuerit: fiat R/post fuerit scr. et del. fuerit S/redunt: reduntur ErP1; redent P3; red-
 dant R/aliquid (115) om. ErP1S 115 nichil: non R/sentiet: sentiret P1S/et . . . visam
 (116) om. R/cum sentit (116) corr. ex consentit E 117 aliquid mg. E

sus sentit rem visam. Et cum radii redunt visui aliquid ex quo
erit sensus visus rei vise, visus non sentiet lucem et colorem
120 que sunt in re visa nisi ex aliquo veniente a luce et colore que
sunt in re visa ad visum, et radii redunt illud. Secundum ergo
omnes dispositiones non erit visus nisi per adventum alicuius
rei vise a re visa, sive exierint a visu radii sive non.

[6.53] Et iam declaratum est quod visio non completur nisi
125 per diafonitatem corporis medii inter visum et rem visam, et
non completur quando fuerit medium inter eos corpus non dia-
fonum. Et est manifestum quod corpus diafonum in nullo dis-
tinguitur a non diafono nisi secundum modum predictum. Et
cum ita est, ut diximus, et fuit declaratum quod forma lucis et
130 coloris que sunt in re visa perveniunt ad visum quando fuerit
opposita visui, illud ergo quod venit ex re visa ad visum per
quod visus comprehendit lucem et colores que sunt in re visa
secundum omnem dispositionem non est nisi ista forma, sive
exeant radii sive non.

[6.54] Et iam declaratum est quod forme lucis et coloris
135 semper generantur in aere et in omnibus corporibus diafonis, et
semper extenduntur in aere et in corporibus diafonis ad partes
oppositas, sive oculus fuerit presens sive non. Exitus ergo ra-
diorum est superfluum et otiosus. Visus ergo non sentit lucem
140 et colorem rei vise nisi a forma veniente a luce et colore que
sunt in re visa.

[6.55] Et iam declaratum est quod forma cuiuslibet puncti
rei vise oppositi visui pervenit ad visum secundum verticatio-
nes multas diversas, et quod visus non potest apprehendere
145 formam rei vise secundum suam ordinationem in superficie rei
vise nisi quando receptio formarum fuerit ex verticationibus
linearum rectarum que sunt perpendiculares super superficiem
visus et super superficiem membri sentientis, et quod linee rec-
te perpendiculares non erunt super istas superficies nisi quan-

118 redunt: reddant R/ex . . . vise (119): per quod visus sentit rem visam EP3R (visus
sentit *transp.* R) 120 que¹: qui EP3/post visa *scr. et del.* ad visum et radii redunt visui
aliquid S/nisi *om.* Er 121 post illud *scr. et del.* a visu P3 123 a visu *om.* R; *mg.*
a. m. E 126 post quando *add.* non Er/eos: ea R/post eos *scr. et del.* non E/non²
mg. E 127 est *om.* P15/in nullo *om.* Er/in . . . diafono (128): a non diaphano in nullo
distinguitur R 128 nisi *om.* Er 129 est: sit R; *inter.* a. m. S/fuit: fuerit EP1P3;
sit R 130 perveniunt: perveniant R 131 opposita: oppositae R; per *inter.* P1
132 colores: colorem P1 133 post nisi *add.* ist ita P1 (*scr. et del.* ist) 136 post
semper *scr. et del.* perveniunt P1/generantur: generentur R 137 extenduntur:
extendantur R 139 lucem: lumen S 140 a¹: ex EP3R/que: qui P3 142 post
et *add.* etiam Er/iam *om.* EP3R 143 oppositi *corr.* ex. opposita EP3 (a. m. E)
146 post receptio *add.* visus EErP3 147 ante que *add.* et P3/sunt: sun S 148 et
. . . superficiem *inter.* a. m. E/super *om.* EP3/post quod *scr. et del.* lux P1

150 do centrum istarum superficierum fuerit unum punctum, et
quod hoc est possibile. Et cum hoc totum sit sicut dictum est,
oportet quod centrum superficiei glacialis et centrum superfici-
ei visus sint unum punctum. Visus ergo nichil potest compre-
hendere ex formis rerum visarum nisi ex verticationibus line-
155 rum rectarum quarum extremitates concurrunt apud hoc cen-
trum tantum. Et hoc est quod promisimus ante declarare in
hoc capitulo in precedenti sermone de forma visus, et iam
declaratum est: scilicet quod centrum glacialis et centrum
superficiei visus sunt idem punctum commune.

160 [6.56] Et cum hoc declaratum est, remanet ergo modo con-
siderare opinionem ponentium radios et declarare quid sit ex
ea falsum et quid verum. Dicamus ergo si visio sit ex re exeun-
te ex visu ad rem visam, illa res aut est corpus aut non est cor-
pus. Si est corpus, quando nos aspexerimus celum et videri-
165 mus stellas que sunt in eo, oportet quod in illa hora exeat a
nostro visu corpus, et impleat illud quod est inter celum et
terram, et quod nichil diminuatur a visu; et hoc est falsum.
Visio ergo non est per corpus exiens a visu ad rem visam. Et si
illud quod exit a visu fuerit non corpus, illud non sentiet rem
170 visam, sensus enim non est nisi in corporibus. Nichil ergo exit
a visu ad rem visam sentiens rem illam.

[6.57] Et manifestum est quod visio est per visum. Et cum
hoc est, et visus non comprehendit rem visam nisi quando exit
ab eo aliquid ad rem visam, et illud quod exit non sentit rem
175 illam visam, illud ergo quod exit a visu ad rem visam non redit
ad visum aliquid quo visus comprehendit rem visam. Et hoc
quod exit a visu non est sensibile sed opinabile, et nichil debet
putari nisi per rationem. Ponentes autem radios opinantur hoc
quia illi invenerunt quod visus comprehendit rem visam et inter
180 eos est spatium; et magnum est hominibus quod sensus non est

150 *post fuerit add. in P1/et . . . possibile (151) om. R* 151 *quod om. P3; scr. et del. E/*
possibile: impossibile EP1P3 152 *quod: ut R; om. EP3/superficiei corr. ex superfi-*
cialis P3 157 *et . . . est (158) om. R* 158 *est om. P3* 160 *est: sit R/ergo*
om. P1S 161 *post radios add. exire a visu R/ex: in R* 163 *ex: a Er/illa: ista R/*
post res scr. et del. a S/est² om. EP3R 164 *si est corpus om. P3/nos om. R/aspexer-*
imus: inspexerimus P1S 165 *sunt in eo: in eo sunt P3/in² om. P3* 166 *nostro*
visu transp. EP3R/impleat: implet Er 168 *per om. P3; inter. a. m. E* 169 *fuerit:*
est EP3/fuerit non: non est R 170 *enim: ergo EP3* 172 *est¹ inter. P3*
173 *est: sit R/comprehendit: comprehenderit Er; comprehendat R/nisi om. P3*
174 *eo corr. ex ea E/aliquid om. R* 175 *illam om. Er/visam om. P1S* 176 *com-*
prehendit: comprehendat ErR 177 *exit: dicitur exire Er* 178 *post radios add.*
exire a visu R 179 *quia: quod EEP3R/post illi add. non S; scr. et del. opinantur hoc*
quod E/invenerunt: invenerunt S 180 *eos: illos EP3; illa R/magnum: manum P1*

nisi per contactum, quare illi opinati sunt quod visio non sit nisi per aliquod exiens a visu ad rem visam, ita quod illud exiens sentiat rem visam in suo loco aut accipiat aliquid a re visa, et redet ipsum visui, et tunc sentiet illud visus.

185 [6.58] Et cum non potest exire a visu corpus sentiens rem visam, et nichil sentit rem visam nisi sit corpus, non remansit opinari nisi quod illud quod a visu exit ad rem visam recipit a re visa aliquid et redit ipsum visui. Et cum declaratum est quod aer et corpora diafona recipiunt formam rei vise et red-
190 unt ipsam visui et omni corpori opposito rei vise, tunc illud quod opinatur quod redit visui aliquid ex re visa non est nisi aer et corpora diafona inter visum et rem visam. Et cum aer et corpora diafona redunt visui aliquid ex re visa, in quolibet tempore redunt et secundum omnes dispositiones quando
195 visus fuerit oppositus rei vise sine indigentia alicuius rei exeuntis a visu. Ratio ergo que induxit ponentes radios ad dicendum radios esse est superflua, quoniam illud quod induxit eos ad dicendum quod radii essent est sua opinatio quia visio non potest compleri nisi per aliquod extensum inter visum et rem
200 visam ut redat visui aliquid ex re visa. Et cum aer et corpora diafona faciant hoc sine indigentia alicuius rei exeuntis a visu, et sunt cum hoc extensa inter visum et rem visam, sine indigentia tunc ad apponendum aliam rem redentem visui aliquid de re visa nulla est opinio. Dicere ergo esse radios est nichil.

205 [6.59] Et etiam omnes mathematici dicentes esse radios non utuntur in demonstrationibus eorum nisi lineis ymaginatis tantum, et vocant ipsas lineas radiales. Et iam declaravimus nos quod visus nichil comprehendit ex rebus visis nisi ex verticationibus istarum linearum tantum. Opinio ergo opinantis
210 quod lineae radiales sunt ymagnate est opinio vera, et opinio

181 contactum: tactum *P1* 182 aliquod: aliquid *EP3R/post* visam *scr. et del. per S/* ita ... visam (183) *om. P1/quod: ut R/illud corr. ex aliud S* 183 sentiat *corr. ex sensit P3/visam om. EP3R/accipiat: accipiet Er* 184 redet: reddat *R/sentiet: sentiat R*
185 cum: quia *R* 186 et ... visam *rep. P1/post* sentit *scr. et del. se Er/sit om. P3R*
187 quod¹: ut *R/a visu exit: exit a visu Er/recipit: recipiat R* 188 re visa: viso *R/* redit: reddat *R/cum: quia R* 191 opinatur *corr. ex opponitur S* 194 *post* dispositiones *scr. et del. et E/quando: quoniam Er* 195 exeuntis (196) *om. Er*
198 essent *corr. ex esset a. m. S/post* sua *add. opinio vel EP3; add. illorum opinio R/quia: quod Er* 199 compleri *corr. ex impleri S/aliquod: aliquid EP3R* 200 ut: quod *R/visui corr. ex visio P1/visui aliquid transp. ErS/et² inter. S* 201 faciant: faciunt *P3*
202 sunt cum hoc: sint insuper *R/sine om. Er* 203 apponendum: ponendum *ErR/visui aliquid transp. EP3R* 204 opinio *om. Er/esse om. P1; inter. E/esse ... nichil: radios esse nichil est S* 206 eorum *om. EP3R/ymaginati: imaginariis R*
207 *post* lineas *add. et Er* 208 quod visus *corr. ex visus quod Er/comprehendit om. P1* 209 opinantis: opinantium *EP3R* 210 ymagnate: imaginariae *R; corr. ex ymaginates P3; corr. ex opinat P1*

opinantis quod aliquid exit a visu est opinio falsa. Et iam declaravimus quod hoc esse non affirmat eos nec ratio induxit.

[6.60] Iam ergo declaratum est ex omnibus que diximus quod visus non sentit lucem et colorem que sunt in superficie rei vise nisi per formam extensam a superficie rei vise ad visum per corpus diafonum medium inter visum et rem visam, et quod visus nichil comprehendit ex formis nisi ex verticationibus linearum rectarum que ymaginantur extense inter rem visam et centrum visus tantum que sunt perpendiculares super omnes superficies tunicarum visus. Et hoc est quod volumus declarare.

[6.61] Ista ergo est qualitas visionis generaliter, quoniam visus non comprehendit ex re visa sensu spoliato nisi lucem et colorem que sunt in re visa tantum. Res autem residue quas comprehendit visus ex rebus visis, sicut figuram, et magnitudinem, et sibi similia, non comprehenduntur a visu spoliato sensu sed per rationem et signa. Et hoc nos declarabimus post in secundo tractatu post declarationem completam apud nostrum sermonem in distinctione rerum visibilibus quas comprehendit visus. Et hoc quod declaravimus—scilicet qualitatem visionis—est conveniens opinioni verificantium mathesim et naturam. Et declaratum est ex hoc quod due secte dicunt verum et quod due opiniones sunt recte et convenientes, sed non completur altera earum nisi per alteram, nec potest esse visio nisi per illud quod aggregatur ex duabus.

[6.62] Sensus ergo non est nisi ex forma et ex operatione forme in visum et ex passione visus ex forma, et visus est paratus ad patiendum ex ista forma secundum situm proprium, scilicet situm verticationum perpendicularium super suam superficiem. Natura autem visus non appropriatur ista propri-

211 opinantis: opinantium R/et... induxit (212) om. R 212 quod hoc esse: hoc esse quod S (hoc inter. a. m.)/ante non scr. et del. hoc S; add. esse inter. a. m. S 213 omnibus que: omni quod Er 215 per inter. S 216 post diafonum scr. et del. a superficie rei vise P1 218 ymaginantur: intelliguntur R/extense om. Er 220 volumus: volumus EP3 222 ergo est transp. ErR/quoniam: quod R 223 post visus scr. et del. com Er/post sensu add. ex P3 224 autem: aut Er 225 post et add. sicut Er; scr. et del. i P1 226 sibi om. R/spoliato sensu (227) transp. R 227 sed: immo EP3/signa corr. ex figuram P3/nos declarabimus transp. EP3/post declarabimus scr. et del. cum E 228 completam corr. ex com a. m. S/nostrum sermonem (229) transp. EP3R 229 sermonem om. Er/in: de R/quas corr. ex qua S/comprehendit (230): comprehendet Er 230 hoc om. P3 231 conveniens: communicans P3; corr. ex communicans a. m. E/verificantium: verificatum Er 232 naturam: naturalem P1; verum P3/post est scr. et del. hoc Er/dicunt: dicant R 233 sunt: sint R 235 quod om. P3/post duabus add. sectis EP3R 237 post in add. sensum EP3/ex²: a EP3R 238 situm: suum EP3 240 visus om. P1/appropriatur: congregatur R/ista proprietate (241): isti proprietati R

etate nisi quia non distinguuntur visibilia nec ordinantur partes
cuiuslibet eorum apud visum nisi quando sensus eius fuerit ex
istis verticationibus tantum. Linee ergo radiales sunt linee
ymaginabiles, et figuratur per eas qualitas situs super quam
245 patitur visus ex forma.

[6.63] Et iam declaratum est quod, visus quando fuerit op-
positus rei vise, figurabitur inter rem visam et centrum visus
piramis cuius conus erit centrum visus et basis eius superficies
rei vise. Et erit inter quodlibet punctum superficiei rei vise et
250 inter centrum visus linea recta ymaginata perpendicularis su-
per superficies tunicarum visus, et sic erit piramis continens
omnes istas lineas. Et erit superficies glacialis secans istam
pyramidem, quoniam centrum visus quod est conus pyramidis
est a posteriori superficie glacialis; et cum aer qui est inter vi-
255 sum et rem visam fuerit continuus, erit forma extensa ab illa re
visa secundum verticationem ipsius pyramidis in aere quam
distinguit ipsa piramis et in tunicis visus diafonis usque ad
partem superficiei glacialis que distinguitur per istam pyrami-
dem. Et erit piramis continens omnes verticationes que sunt
260 inter visum et rem visam ex quibus comprehendit visus for-
mam rei vise, et erit forma ordinata in ista pyramide sicut est
ordinata in superficie rei vise et in ista parte superficiei gla-
cialis.

[6.64] Et iam declaratum est quod sensus non est nisi per
265 glaciale. Sensus ergo visus ex lumine et colore que sunt in su-
perficie rei vise non est nisi ex parte glacialis quam distinguit
piramis figurata inter illam rem visam et centrum visus. Et iam
predictum est quod in isto humore est aliquantule diafonitatis
una pars et aliquantule spissitudinis, et propter hoc assimula-
270 tur glaciei. Quia ergo est in ea aliquantule diafonitatis, recipit

242 cuiuslibet *corr. ex cuiuscumque P1/visum corr. ex visibilia E/eius om. P1S*
243 istis verticationibus *transp. P1RS* 244 situs *om. Er/quam: quem EP3*
246 *post quod scr. et del. forma E/visus . . . oppositus (247): quando visus . . . fuerit R*
247 *post centrum scr. et del. eius s E* 248 *piramis: pyramidis P1/conus: vertex R*
250 *ymaginata: intellecta R/perpendicularis: perpendiculariter P3R; alter. in perpen-*
diculariter a. m. E/super (251) om. Er 251 *superficies corr. ex superficie P3/post*
superficies scr. et del. perpendicularis P1/et sic erit om. P3/erit om. R/continens: con-
tinebit R 252 *erit om. R/secans: secabit R/istam om. P3* 253 *conus: vertex R*
254 *qui: quod EP1S/inter: in E; corr. ex in a. m. P3* 256 *ipsius: illius EP3/*
pyramidis: piramis Er 257 *ipsa: illa P3* 259 *erit: ista R/continens: contine-*
bit R 261 *in ista pyramide om. EP3R* 262 *ista parte transp. R* 265 *lumine:*
luce R 268 *predictum: declaratum R/aliquantule . . . pars (269): una pars . . .*
diafonitas Er/aliquantule . . . spissitudinis (269): aliquantula diaphanitas et aliquantu-
la spissitudo R/diafonitatis . . . aliquantule (269) inter. a. m. S 270 *glaciei: glaciali*
P3/est in ea: in earum est Er/ea: eo R/aliquantule: aliquantum R/diafonitatis corr.
ex diafonitas P1/recipit: respicit Er

formas, et pertranseunt in ea cum eo quod est ex ea de diafonitate; et quia in ea est aliquantule spissitudinis, prohibet formas a transitu in ea cum eo quod est ex ea de spissitudine. Et figuntur forme in eius superficie et corpore. Et similiter
 275 quodlibet corpus diafonum in quo est aliquid spissitudinis, quando super ipsum oritur lux, pertransibit in eo secundum id quod est in eo de diafonitate, et figitur lux in superficie eius secundum quod est in eo de spissitudine.

[6.65] Et etiam glacialis est preparata recipere istas formas
 280 et ad sentiendum ipsas. Forme ergo pertranseunt in ea propter virtutem sensibilem recipientem.

[6.66] Et cum forma pervenit in superficie glacialis, operabitur in ea, et glacialis patietur ex ea, quoniam ex proprietate lucis est ut operetur in visu et ex proprietate visus est ut patiat
 285 atur ex luce. Et ista operatio quam operatur lux in glaciali pertransit corpus glacialis secundum rectitudinem linearum radialium tantum, quoniam glacialis est preparata ad recipiendum formas lucis ex verticationibus linearum radialium. Et cum lux pertransit in corpus glacialis, color pertransit cum ea,
 290 color enim est admixtus cum luce. Et glacialis recipit istam operationem et istum pertransitum, et ex ista operatione et passione erit sensus glacialis ex formis rerum visarum que sunt in sua superficie. Et pertranseunt per totum suum corpus, et ex ordinatione partium forme in sua superficie et in suo toto
 295 corpore erit sensus eius ex ordinatione partium operantis.

[6.67] Et ista operatio quam operatur lux in glaciale est ex genere doloris. Tamen quidam dolores sunt passibiles et

271 *post et add. hae R/ea^{1,2}: eo R/est om. P1/de om. ErP3* 272 *aliquantule: aliquantulum R* 273 *ea^{1,2}: eo R/ex: in Er* 274 *figuntur corr. ex figurantur EP3 (a. m. E)/post superficie add. sed debiliter E/corpore: corpora S/post corpore add. sed debiliter P3R/post similiter add. est R* 276 *oritur lux transp. P1/post eo scr. et del. quod P1/id om. R; corr. ex aliquid EP3 (a. m. E)* 277 *in¹ . . . est (278) mg. a. m. S/ diafonitate: diafone Er/figitur: figetur R* 278 *ante quod add. id EP3R/quod om. Er* 279 *preparata recipere: praeparatus ad recipiendum R* 280 *forme ergo pertranseunt: figure pertranseunt ergo P3/ea: eo R* 282 *pervenit: pervenerint ErR/superficie: superficiem R/operabitur (283) operatur EP3R* 283 *patietur: patitur R* 284 *lucis est corr. ex visus est P1/visu: visum R/et om. P1/est² om. P3R/ut² corr. ex aut P3* 285 *ex: a EP3R/in om. P1* 286 *glacialis om. P1* 287 *est preparata transp. P3/preparata: praeparatus R* 288 *formas corr. ex tres S/linearum radialium transp. Er* 289 *pertransit¹ corr. ex fuerit P1/post glacialis scr. et del. color pertransit in corpus glacialis P3* 290 *enim est transp. Er/post enim add. in EP3 (inter. a. m. E)/ admixtus . . . luce: permixtus luci R/recipit corr. ex respicit Er/istam: illam EP3* 291 *ista: illa S* 292 *post rerum add. visibilium vel EP3/visarum: visibilium R* 293 *sua om. EP3/sua superficie transp. R* 294 *et om. S/in² om. EP3R/suo toto transp. S* 296 *quam: quoniam S* 297 *tamen: cum R/sunt: sint R*

non angustiat²⁹⁸ur membrum propter eos, et tales dolores non
 manifestantur sensui, nec iudicat²⁹⁹ dolens quod sit dolor. Et
 300 significatio super hoc est quod lux inducit dolorem, quia luces
 fortes angustiant visum et ledunt manifeste, sicut lux solis,
 quando aspiciens aspexerit corpus ipsius, et sicut lux solis
 reflexa a corporibus t³⁰⁰ersis ad visum, quoniam iste luces induc-
 unt dolorem manifestum in visum. Et operatio omnis lucis in
 5 visum est ex uno genere, et non diversatur nisi secundum mag-
 is et minus. Et cum omnes sunt ex uno genere, et operatio forti-
 orum lucium est ex genere doloris, omnes ergo operationes luci-
 um sunt de genere doloris, et non diversantur nisi secundum
 magis et minus. Et propter levitatem operationum lucium de-
 10 bilium temperatarum in visum, latet sensus eas inducere dolor-
 em. Sensus ergo glacialis ex operatione lucis est de genere sen-
 sibilis dolorosi.

[6.68] Deinde iste sensus qui cadit apud glaciale³⁰¹m exten-
 ditur in nervo obtico et venit ad anterius cerebri, et illic est
 15 ultimus sensus et sentiens ultimum quod est virtus sensitiva
 que est in anteriori cerebri, et ista virtus comprehendet sensibi-
 lia. Visus autem non est nisi quoddam instrumentum istius
 virtutis, quoniam visus recipit formas rerum visarum et redit
 eas sentienti ultimo, et sentiens ultimum comprehendit illas
 20 formas et comprehendit ex eis res visibiles que sunt in eis. Et
 illa forma in superficie glacialis extenditur in corpore glacialis,
 deinde in corpus subtile quod est in concavo nervi quousque
 perveniat ad nervum communem. Et apud perventum forme
 ad nervum communem completur visio, et ex forma pervenien-
 25 te in nervo communi comprehendet ultimum sentiens formas
 rerum visarum.

298 angustiat²⁹⁸ur: laeditur R; corr. ex angustiantur P1/membrum: membrorum Er/post
 eos add. dolores S 299 iudicat corr. ex indicat EP3 (a. m. E) 300 est om. P1
 1 angustiant: offendunt R 2 post quando add. lux EP3 (scr. et del. lux E)/et om. P1
 3 ad rep. Er 4 dolorem manifestum: dolores manifestos EP3R 5 ex inter. a. m.
 S/uno: eodem EP3R/diversatur: diversantur Er; diversificatur R 6 sunt: sint R/
 post genere scr. et del. et non diversantur Er 7 lucium . . . operationes om. P1/
 operationes: generationes S 8 non om. Er/diversantur: diversificantur R
 9 operationum: operationis Er 10 eas corr. ex eorum P1 11 ergo inter. P1/post
 lucis add. et coloris P1/sensibilis (12): sensus Er/sensibilis dolorosi (12): sensibili do-
 loris P3 16 que: quod S/post ista scr. et del. est P3/comprehendet: comprehendit R;
 corr. ex comprehendit P3 18 recipit corr. ex respicit Er 19 sentiens corr. ex
 sensit P3 20 comprehendit: comprehendet EE 21 post illa scr. et del. illa Er/
 corpore: superficie E; superficiem P3/glacialis²: glaciali P1S 23 et . . . communem
 (24) rep. P1 24 ad: apud R/post communem scr. et del. et apud S/perveniente (25):
 veniente EP3R; corr. ex pervenientia P1 25 nervo communi: nervum communem
 R/ultimum sentiens transp. Er

[6.69] Sed aspiciens comprehendet res visas duobus oculis;
et sic oportet ut forma rei vise perveniat in utroque visu, quare
pervenient in visu ab una re visa due forme. Tamen aspiciens
30 comprehendet unam rem visam, et hoc est quia due forme que
pveniunt in duobus visibus ex uno viso, quando perveniunt
ad nervum communem, concurrunt due forme, et superponetur
una alii, et efficietur una forma. Et ex illa forma adunata ex
duabus formis comprehendet ultimum sentiens formam illius
35 visi.

[6.70] Et significatio super hoc quod due forme que per-
veniunt in duobus oculis ab uno viso adunantur et efficiuntur
una forma antequam comprehendat ipsam ultimus sensor et
quod ultimus sensor non comprehendit formam nisi post
40 adunationem duarum formarum est quod aspiciens, quando
mutaverit situm sui oculi unius et alius fuerit immotus, et mo-
tus oculi mutati secundum situm fuerit ad anterius, videbit de
re una opposita duas. Et si elevaverit unum oculum et cooper-
uerit unum oculum, non videbit nisi unum.

[6.71] Si ergo sentiens comprehendisset unum quia unum,
deberet comprehendere ipsum semper unum; et si venissent ad
ipsum semper due forme ab uno viso comprehenderet semper
unum visum duo. Et cum ultimum sentiens non comprehendet
visum nisi ex forma veniente ad ipsum et aliquando compre-
50 hendet unam rem visam duo et aliquando unum est signum
quod id quod venit ad ipsum, quando comprehendit ipsum
duo, veniunt due forme, et quando comprehendit unam rem

27 sed: et R 28 perveniat *corr. ex* perveniant S/in . . . visu: ad utrumque visum R/
quare: quia Er 29 in visu: ad visum R/tamen: cum R 30 comprehendet:
comprehendat R 31 in: ad R/duobus visibus: duos visus R/visibus: visis P3/viso:
visu P3/pveniunt: pervenerint Er 32 due forme *om. R*/superponetur: suppone-
tur P3; superponitur R 33 efficietur: efficitur R 34 comprehendet: comprehen-
dit R/sentiens *corr. ex* sens P1 35 visi *corr. ex* visus P1 36 hoc *inter. a. m. E*/post
hoc *add. est* EP3R (*inter. a. m. E*) 37 in . . . oculis: ad duos oculos R/adunantur:
ordinatur P3R/*ante et scr. et del.* visam S/efficiuntur: efficiantur P3 38 ipsam . . . et:
ipsas ultimum sentiens R/ipsam . . . comprehendit (39) *mg. a. m. S* 39 quod . . .
sensor *om. P1*/ultimus sensor: autem ultimum sentiens R/comprehendit: compre-
hendat EP3RS; comprehendet P1 40 aspiciens *om. EP3*/aspiciens quando
transp. R 41 sui *om. P1R*/immotus *corr. ex* non S 42 *ante* oculi *add. unius* EP3R/
mutati: mutari S 43 una: visa Er/elevaverit: aperuerit R/*post* oculum *scr. et del.*
non videbit nisi unum S/cooperuerit (44): cooperierit EP3; cooperuit S 44 unum
oculum: alterum R; *transp. EP3*/*post* nisi *scr. et del.* oculum Er 46 comprehendere
ipsum *transp. R* 47 comprehenderet: comprehendet EP3/semper: super P3
48 comprehendet: comprehendat R 49 *post ex scr. et del.* verti P1/comprehendit
(50): comprehendat R 50 duo: duas R/unum: unam R 52 *ante* due *add. est*
forma duplex R; *scr. et del.* d Er

visam unam, quod venit ad ipsum est forma una. Et cum in
 utraque dispositione perveniunt ab uno viso in duos oculos
 55 due forme, et illud quod reditur ultimo sentienti aliquando est
 due forme et aliquando una forma, et forma que reditur ultimo
 sentienti non reditur nisi a visu, tunc illud quod reditur ultimo
 sentienti ex duabus formis que perveniunt in duobus oculis ab
 uno viso, quando comprehendit ipsum unum, est una forma.

60 [6.72] Et cum ita est, due ergo forme predictae extenduntur
 a duobus oculis et concurrunt antequam comprehendat ipsas
 sentiens ultimus, et post concursum adinvicem comprehendet
 sentiens ultimus formam adunatam ex eis. Et due forme que
 perveniunt in duobus oculis ab uno viso, quando comprehendit
 65 ipsum duo, extenduntur a duobus oculis et non concurrunt, et
 perveniunt ad ultimum sentiens et sunt due forme.

[6.73] Et etiam comprehensio unius visi apparentis ali-
 quando unum aliquando duo significat quod visio non est per
 oculum solummodo, quoniam si ita esset, apud comprehensio-
 70 nem unius visi apparentis comprehenderent duo oculi ex dua-
 bus formis provenientibus in eos unam et eandem formam. Et
 si ita esset, comprehenderent semper ex duabus formis unam.

[6.74] Et cum unum visum comprehendatur aliquando un-
 um et aliquando duo, et in utraque dispositione sint in duobus
 75 oculis due forme significat quod illic est alius sentiens preter
 duos oculos apud quem perveniunt ab uno viso quando com-
 prehenduntur per unum due forme unum et apud quem com-
 prehenduntur due forme quando comprehenduntur due, et
 quod sensus non completur nisi per illud sentiens tantum, non
 80 per oculum tantum.

[6.75] Et etiam sensus non extenditur a membris ad ulti-
 mum sentiens nisi in nervis continuatis membris et cerebro.

53 unam *scr. et del. P3/forma una transp. Er* 54 ab *corr. ex ad S/in: ad R* 55 redi-
 tur *corr. ex reduntur E/post sentienti scr. et del. non reditur S* 56 due: duplex *R/*
 forme: forma *R/et¹ om. EP3R/forma¹ om. R* 57 post tunc *add. enim EP3/quod om. P1*
 58 in . . . oculis: ad duos oculos *R* 59 comprehendit: comprehenditur *EP3;*
 comprehenderit *R* 60 est: sit *R* 61 a: ad *Er* 62 sentiens ultimus: ultimum
 sentiens *R/adinvicem: inter se R* 63 ultimus: ultimam *R/formam inter. P3*
 64 in . . . oculis: ad duos oculos *R/post duobus scr. et del. formis Er/post quando add.*
 ultimum sentiens *R/comprehendit: comprehenderit P1* 65 extenduntur *corr. ex*
 extenditur *a. m. E* 67 etiam *om. R/apparentis: quod apparet R* 70 unius *om.*
R/unius visi transp. EP3/apparentis: quod unum apparet R/comprehenderent: com-
 prehendent *EP3* 71 provenientibus: pervenientibus *RS/in: ad R/et eandem om.*
Er/eandem: eadem S 72 si ita: sive *P1/esset: essent E; corr. ex essent P3/post formis*
scr. et del. pervenientibus in eos S/post unam add. formam EP3R 74 et¹ *om. EP3R/*
 aliquando: a natura *P1/sint: sunt Er* 75 significat: significatur *R/alius: aliud EP3R;*
 alicuius *Er* 76 quem: quod *R* 77 quem: quod *R; corr. ex quod S* 79 sentiens:
 sentientis *S* 82 post et *add. in S*

Due ergo forme extenduntur ab oculo in nervo extenso inter
oculum et cerebrum quousque perveniant ad ultimum sentiens.

85 Iste ergo due forme extenduntur a duobus oculis et concurrunt
in loco concursus duorum nervorum.

[6.76] Et significatio manifesta quod forme rerum visarum
extenduntur in concavo nervi, et perveniunt ad ultimum senti-
ens, et post perventum completur visio est quod, quando fuerit
90 opilatio in isto nervo, destruetur visio, et cum destruetur opi-
latio, revertetur visio. Et ars medicinalis testatur hoc.

[6.77] Quare vero aliquando concurrunt due forme et ali-
quando non est quia, quando situs duorum oculorum fuerit
naturalis, erit situs eorum ab uno viso situs consimilis, et sic
95 perveniet forma unius visi in duo loca consimilis situs. Et cum
fuerit declinans situs unius oculorum, diversabitur situs oculo-
rum ab illo viso, et sic perveniunt due forme illius visi diversi
situs. Et iam predictum est in forma oculi quod situs nervi
communis a duobus oculis est situs consimilis, et sic erit situs
100 duorum locorum consimilis situs a duobus oculis ab eodem
loco nervi communis situs consimilis, et ex duobus nervis con-
cavis fit unus in quo uniuntur due forme visus.

[6.80] Et licet dicere quod forme pervenientes in oculo non
perveniunt ad nervum communem, sed sensus extendetur ab
105 oculo ad nervum communem sicut extenditur sensus doloris et
sensus tactus, et tunc comprehendit ultimum sentiens illud
sensible.

[6.81] Et nos dicemus quod sensus ipse veniens ad oculum
pervenit ad nervum communem omnino; tamen sensus qui per-
venit ad oculum non est sensus doloris tantum, sed est sensus
110 operationis de genere doloris, et sensus lucis et coloris, et sen-
sus ordinationis partium visi. Sensus autem diversitatis color-
is et ordinationis partium visi non est de genere doloris. Et

84 perveniant: perveniat Er 85 concurrunt *corr. ex concurcurrunt* P3 87 mani-
festa: manifestatur P3; *corr. ex manifestatur* E 89 completur: compleatur R/est om.
EP3/est . . . visio (90) *mg. a. m. S* 90 destruetur¹: destruitur R/cum destruetur:
quando destruitur R/opilatio (91) om. ErP1; *inter. a. m. S* 91 ante revertetur *add. et*
ErS/revertetur: revertitur RS 92 aliquando concurrunt *transp. Er/concurrunt*:
concurrant R/et om. R 94 *post uno scr. et del. eorum Er/viso: visio Er*
95 perveniet: perveniret S 96 declinans: declinatus S/situs . . . diversabitur om. P1/
oculorum¹: oculi R/situs² *mg. P3* 97 illo: isto P1S/et *corr. ex quia E/perveniunt*:
perveniunt R 99 *post oculis scr. et del. ab eodem loco S* 100 situs *inter. a. m. E*
101 communis *corr. ex communi S/consimilis corr. ex consimis* S 103 pervenientes:
venientes EP3R/in oculo: ad oculum R 104 extendetur: extenditur EP3R
106 et . . . sensible (107) om. P3 109 tamen: cum Er 111 *post et¹ add. est EP1P3R*
112 visi *corr. ex isi S/coloris (113): colorum Er* 113 de: in EP3R

nos declarabimus post quomodo erit sensus visus ex omnibus
 115 rebus istis. Sensus ergo perveniens in nervo communi est sensus
 lucis et coloris et ordinationis, et illud a quo comprehendit
 sentiens ultimum lucem et colorem est aliqua forma.

[6.83] Et remanet modo dicere questionem que est: Quando
 forme lucis et coloris extenduntur in aere et in corporibus
 120 diafonis et perveniunt ad visum, et aer et corpora diafona
 recipiunt omnes colores, et forme cuiuslibet lucis que sunt pre-
 sentes in eodem tempore extenduntur in eodem tempore et in
 eodem aere, et perveniunt ad unum oculum et pertranseunt
 diafonitatem tunicarum visus, quare oportet ut admisceantur
 125 isti colores et lux in aere et in corporibus diafonis et perveniant
 ad visum omnia mixta, et sic non distinguuntur a visu colores
 rerum visarum. Et si ita est, sensus ergo visus non potest esse
 ex istis formis.

[6.84] Dicamus ergo quod aer et corpora diafona non im-
 130 mutantur a coloribus nec alterantur ab eis alteratione fixa, sed
 proprietas coloris et lucis est quod forme eorum extenduntur
 secundum verticationes rectas, et ex proprietate corporis dia-
 foni est quod non prohibet formas lucis et coloris transire per
 suam diafonitatem. Et illud non recipit formas istas nisi re-
 135 ceptione ad redendum, non receptione ut alteretur. Et declar-
 atum est quod forme lucis et coloris non extenduntur in aere
 nisi secundum lineas rectas. Forme ergo lucis et coloris que
 sunt in corporibus presentibus simul in eodem aere extendun-
 tur secundum lineas rectas, et erunt ille linee super quas ex-
 140 tenduntur forme diverse quedam equidistantes, et quedam
 secantes se, et quedam diversi situs; et quilibet verticatio ea-
 rum est distincta per corpus a quo descenditur forma super

114 declarabimus post *transp.* Er 115 nervo communi: nervum communem R
 118 dicere: explicare R/quando (119) quoniam EP3R 119 forme: forma EP3/
 corporibus *corr.* ex corpore E 120 et³ *inter.* P1 121 *post* forme *add.* et coloris EP3/
post lucis *add.* et coloris Er 122 in . . . extenduntur *om.* P1S/*et inter.* P1/in³ *om.* ES
 123 et¹: etiam P1/*ante* ad *add.* usque EP3/*post* ad *add.* visum vel ad EP3/unum ocu-
 lum: visum R 124 *post* quare *scr.* et *del.* erunt S 126 omnia mixta *transp.* R/non
om. P3/distinguuntur: distinguuntur R 128 istis *corr.* ex eis P1 129 aer et *om.*
 EP3R/corpora diafona: corpus diafonum Er 131 et *inter.* P3/quod: ut R/extendun-
 tur: extendantur EP1P3R 132 secundum: per P1; super S/*post* proprietate *add.* est
 ER/diafoni (133): diafono Er 133 est *om.* EP3R/quod: ut R/prohibet: prohibeat R/
 formas: forma P1/coloris transire: color transito P1 134 et *om.* Er/illud: etiam P3/
post illud *add.* vero Er/istas *om.* R 135 *ante* non *scr.* et *del.* re P1/*ante* ut *scr.* et *del.* ad
 red P1/ut alteretur: ad alterandum R/alteretur: alterentur EP3 140 quedam¹
om. ErP1S 141 et quedam *om.* Er/diversi situs *transp.* P3 142 est: et P3; *inter.*
a. m. ES/descenditur: distenditur Er; descinditur P1S; extenditur R; *alter.* ex distingui-
 tur in distenditur EP3 (*a. m.* E)

illam verticationem. Forme ergo extense a corporibus diversis
in eodem aere extenditur quelibet earum super suam verticati-
145 onem et pertransit ad formas oppositas.

[6.85] Et significatio quod luces et colores non admiscentur
in aere nec in corporibus diafonis est quod, quando in uno loco
fuerint multe candelae in locis diversis distinctis, et fuerint om-
nes oppositae uni foramini pertranseunti ad locum obscurum, et
150 fuerit in oppositione illius foraminis in obscuro loco paries aut
corpus non diafonum, luces illarum candelarum apparent su-
per corpus vel super illum parietem distincte secundum nu-
merum candelarum illarum; et quelibet illarum apparet op-
posita uni candele secundum lineam rectam transeuntem per
155 foramen. Et si cooperiatur una candela, destruetur lux op-
posita illi candele tantum, et si auferatur coopertorium rever-
tetur lux.

[6.86] Et hoc poterit omni hora probari.

[6.87] Et si luces admiscerentur cum aere, admiscerentur in
160 aere foraminis; et debent transire admixte et non distinguuntur
postea. Et nos non invenimus ita. Luces ergo non admiscentur
in aere, sed quelibet illarum extenditur super verticationes rec-
tas; et ille verticationes sunt equidistantes, et secantes se, et
diversi situs. Et forma cuiuslibet lucis extenditur super omnes
165 verticationes quae possunt extendi in illo aere ab illa, et cum
hoc non admiscentur in aere, nec aer tingitur per eas; sed per-
transeunt per suam diafonitatem tantum, et aer cum hoc non
admittit suam formam.

[6.89] Et quod diximus de luce et colore, et quod de aere,
170 intelligendum est in omnibus corporibus diafonis et tunicis vi-
sus diafonis.

[6.90] Membrum vero sentiens, scilicet glacialis, non recipit

143 forme: formarum R/extense: extensarum R 144 extenditur ... earum: quelibet
extenditur R 145 pertransit: pertransibit P1S 146 admiscentur: admittuntur
ErP1; permisceantur R 147 quando: quandoque P3 148 post diversis add. et R
149 uni inter. a. m. S 150 fuerit: fuerint EP3/illius: uni Er 152 distincte corr. ex
distant S/post distincte add. mihi EP3 154 rectam om. R 155 si: ut Er/
cooperiatur corr. ex cooperitur E 156 illi: uni EP3 158 omni ... probari: probari
... hora P1 159 et: quod R/admiserentur^{1,2}: admiscentur Er/cum ... admiscer-
entur inter. a. m. S/in: cum R 160 debent: deberent R/transire: pertransire EEerP3/
distinguentur: distinguerentur EP1P3R 161 postea: post Er/post nos scr. et del. post
Er/ergo om. P1 162 rectas (163) ... verticationes (163) inter. a. m. S 163 et³: etiam
P3; inter. E 164 diversi situs: diversitas S/omnes verticationes (165) transp. Er
165 et ... non (166): hora nec tamen R 166 tingitur: tangitur Er 167 suam:
ipsius R/cum inter. a. m. E/cum hoc om. R 168 admittit: admittit P1S/post admittit
add. vel amittit S/suam formam transp. P1/post suam scr. et del. suam Er 169 post
et⁴ add. de Er/quod de om. R 170 in: de EP3R/post et add. in S 172 vero corr.
ex non S/recipit corr. ex respicit Er

formam lucis et coloris sicut recipit aer et alia diafona non
 sentientia, sed secundum modum diversum ab illo modo,
 175 quoniam istud membrum est preparatum ad recipiendum is-
 tam formam. Recipit ergo istam in quantum est sentiens et in
 quantum est diafonum. Et iam declaratum est quod passio
 eius ex ista forma est ex genere doloris. Qualitas ergo recep-
 tionis eius ab ista forma est diversa a qualitate receptionis
 180 corporum diafonorum non sentientium. Sed tamen istud
 membrum cum sua receptione ab ista forma in quantum est
 sentiens et cum sua alteratione vel mutatione, non tingitur per
 istam formam sua tinctura, nec remanent forme coloris et lucis
 post recessum eius ab earum oppositione vel recessum earum.
 185 [6.91] Et potest contradici huic sermoni, scilicet dicendo
 quoniam iam predictum est quod colores fortes scintillantes
 super quos oriantur luces fortes operantur in oculo, et rema-
 nent sue alterationes in visu post recessum, et remanent forme
 coloris in oculo tempore aliquanto; et quodcumque comprehen-
 190 derit visus post hoc erit admixtum cum illis coloribus. Et hoc
 est manifestum, et non dubitatur. Et cum ita est, visus ergo
 tingitur a colore et luce, et sequitur ut corpora diafona tingan-
 tur a coloribus et lucibus.

[6.92] Et nos dicemus respondendo quod hoc ipsum signi-
 195 ficat quod visus non tingitur a colore et luce, nec remanent in
 eo alterationes coloris et lucis, quoniam iste alterationes quas
 diximus non accidunt nisi extranea fortitudine lucis et coloris.
 Et manifestum est quod iste alterationes non remanent in visu
 nisi modico tempore et post auferuntur, et tunc debiles immu-
 200 tationes non remanet aliquid. Tunc ergo visus non tingitur ab
 istis alterationibus alteratione fixa, nec remanent in eo post

175 preparatum *corr. ex* temperatum EP3 (a. m. E) 176 istam *om.* EP3/in quantum:
 quatenus R/quantum: quam E/in quantum (177): quatenus R 177 quantum:
 quam E 180 diafonorum *corr. ex* dyaphorumno P3/non sentientium *om.* P3/istud:
 illud S 181 in quantum: quatenus R 182 cum *inter. a. m. E* 183 sua: illius
 R; *om. Er/tinctura a. m. E/post tinctura add. fixa Er/coloris et lucis: lucis et coloris Er*
 184 ab earum: a sua EP3R/oppositione: appositione P3/recessum: recessu ERs/earum²:
 eorum EP3 185 huic *corr. ex* hic a. m. S/scilicet: in EP3; *om. R* 186 post quod
add. lucis vel EP3/colores: lucis Er/post fortes add. vel P3 187 oriantur: oriun-
 tur EErP3R 188 sue: illarum R/sue... remanent *mg. a. m. E* 189 quodcumque:
 quantumcumque EEr; quomodocumque P3 190 coloribus: corporibus S
 191 et²: quod R/est²: sit R 192 post et² *scr. et del. co P3/ut: quod R*
 193 coloribus: corporibus P1S/coloribus et lucibus: lucibus et coloribus EP3R
 194 ante quod *add. ad hoc EP3R* 195 post quod *scr. et del. n P1/post et scr. et del. loi*
 P1/remanent *corr. ex* remaneant E 197 ante lucis *add. scilicet fortitudine EP3R*
 199 post debiles *add. sunt EP1P3R* 200 ante non¹ *add. et P1/non¹: nec EP3R/*
 remanet: remanent ERs/tingitur: tingatur E

recessum. Et ex hoc declarabitur quod luces et colores operantur in visum, nec remanent alterationes eorum post recessum, nec parvo tempore. Glacialis ergo alteratur a luce et coloribus tantum quod sentit, deinde aufertur immutatio post recessum. Alteratio ergo eius a colore et luce est necessaria, sed natura non fixa.

[6.93] Et etiam visus est preparatus ad patiendum colores et luces et ad sentiendum eas, et cum hoc non remanet in eo alteratio. Et aer, et corpora diafona, et tunice diafone anteriores glacialis non sunt preparate ad patiendum lucem et colorem et sentiendum ea, et non sunt preparate nisi ad redendum luces et colores tantum.

[6.94] Iam ergo declaratum est quod visus non tingitur ex coloribus et formis lucis tinctura fixa. Et declaratum est quod forme lucis et coloris non admiscuntur in aere et in corporibus diafonis et quod visus multi comprehendunt ipsos in aere et in eodem tempore; et quilibet eorum comprehendit ipsos secundum pyramidem que distinguit inter ipsam et centrum visus.

[6.95] Quare vero non apparent omnes forme omnium colorum super omnia corpora illa, sed quedam apparent et quedam non, non est nisi quando color fuerit fortis, et lux que est in colore fuerit fortis, et lux que est in corpore super quod apparet forma coloris debilis? Et hoc pertinet ad visum, quoniam iste forme non oriuntur super corpora opposita illis sed super corpora illuminata cum quolibet lumine colorato. Quoniam forma lucis et coloris eius semper oriuntur super omnia corpora opposita illis quorum remotio non est extranea multa fortis longa. In lucibus vero hoc manifestatur, quoniam, quando fuerit experimentatum omne corpus illuminatum quolibet lumine (ita quod non fuerit lux valde debilis), et fuerit experimentatum secundum modos quos declaravimus--scilicet ut sit

202 et¹: sed P15; om. P3/et¹ . . . recessum (203) mg. a. m. S 203 visum: visu P3/
alterationes eorum transp. R 205 ante tantum add. in P15/quod sentit: ut sentiat R/
post sentit add. et EP3R 206 colore: calore Er/colore et luce: luce et colore P3R/
natura alter. in tinctura a. m. S 208 post patiendum scr. et del. l P1 209 et² inter.
S/ad om. P3/eas: eos R/et³ . . . non: nec tamen R/post remanet scr. et del. not P3
210 post tunice add. visus R/anteriores (211): ante res Er; anterioris R 211 glacialis:
glaciali EP3 212 et²: sed R/non . . . nisi om. R 215 declaratum: determinatum
EP3/est: etiam Er 216 in² om. EP3R 218 quilibet: quodlibet ErP15/ipsos:
ipsas ErP1 219 ipsam: ipsos R 220 apparent: appareant R/post omnium add.
corporum vel EP3R 221 illa: opposita R/apparent: appareant R 222 non est
om. S/color fuerit transp. P15 223 post fuerit scr. et del. fuit P3 225 post forme
add. colorum EP3R/post illis add. nisi illuminentur EP3R 226 colorato om. R
227 forma: forme R 231 non om. EP1P3R/fuerit² corr. ex fuerint P3 232 ante
secundum scr. et del. omne corpus P3/declaravimus: declarabimus Er

positum in sua oppositione corpus album, et illud corpus sit in
loco obscuro, et fuerit inter corpus illuminatum et illum locum
235 obscurum foramen strictum--quoniam super illud corpus tunc
apparebit lux. Colores autem non apparebunt nisi secundum
modum proprium, quoniam declaratum est per inductionem
quod forme colorum semper sunt debiliores ipsis coloribus, et
quanto forme fuerint magis remote a suo principio tanto erunt
240 debiliores.

[6.96] Et declaratum est etiam per inductionem quod for-
tes colores, quando fuerint in locis obscuris et fuerint luces que
sunt super ipsos valde debiles, illi colores apparebunt obscuri,
et non distinguuntur visui. Et quando fuerint in locis illumina-
245 tis, et fuerit lux que est super eum fortis, apparebunt colores et
distinguuntur visui.

[6.97] Et declaratum est etiam per inductionem quod,
quando lux fortis fuerit super formas colorum apparentes
super corpora opposita illis, latebunt visum, et non appare-
250 bunt nisi quando lux non fuerit fortis vel remota.

[6.98] Et etiam declaratum est quod, quando lux fuerit
fortis et pervenerit ad visum, prohibebit ipsum ab apprehen-
sione rerum visarum non apparentium in se multum opposi-
tarum illi tunc.

255 [6.99] Et etiam est declaratum quod visus non comprehen-
dit colores nisi ex forma veniente ad ipsum ex illo colore et
quod comprehensio eius erit secundum verticationes proprias.
Quando ergo inspiciens aspexerit corpus densum super quod
oriebatur forma coloris, non comprehendet illam formam nisi
260 ex forma secunda veniente ad ipsum ex illa forma. Et ista
forma secunda est debilior prima forma que est super illud
corpus, et prima forma est debilior ipso colore. Et visus non
comprehendit ipsum corpus densum super quod apparet

234 illum locum *transp.* R 235 strictum *corr.* ex structum S/quoniam: inveniet
quod R/super . . . lux (236): tunc apparebit lux super illud corpus Er 236 post nisi
add. sint EP3 237 proprium: praedictum R 238 post et *scr.* et *del.* q S
239 magis remote: remotiores R 241 post et *scr.* et *del.* erunt P1/etiam *om.* EP3R/
fortes colores (242) *transp.* Er 242 ante colores *scr.* et *del.* erunt P1/locis *corr.* ex lucis
P1/fuerint²: fiunt P1 243 sunt *om.* Er; *corr.* ex fiunt P3/ipsos: ipsas EP3/illi:
isti EP3R 244 et² . . . visui (246) *om.* Er 245 eum: ipsum EP3; ipsos R
246 visui: a visu R 250 non *om.* EEP3RS/post fuerit *scr.* et *del.* fortis et pervenit ad
visum Er/fortis: debilis Er/fortis vel *om.* EP3R/vel remota *om.* Er; *inter.* a. m. S
251 lux fuerit *transp.* P1 253 in se: vise Er; *corr.* ex vise S/post multum *add.* et R
255 est declaratum *transp.* R 257 eius: ipsius EP3R/propriis *om.* P1
259 comprehendet: comprehendit EP3R 260 forma secunda *transp.* ErR
261 est debilior *transp.* Er 263 ipsum: illud R; *om.* Er

265 forma nisi quando in ea apparet aliqua lux, sive lux veniens
 cum forma coloris super ipsum orientis, sive illa lux cum alia.
 Forma ergo secunda que venit ad visum ex prima forma coloris
 venit ad ipsum cum forma lucis que est in illo corpore denso.
 Et color illius corporis densi super quod est forma comprehen-
 270 detur a visu etiam in illa dispositione. Forma ergo eius coloris
 venit ad visum cum forma secunda veniente ad ipsum ex for-
 ma coloris que est super ipsum, et forma coloris istius corporis
 que venit ad visum in illa dispositione est prima forma. Visus
 autem non comprehendit illud quod comprehendit nisi ex ver-
 ticationibus propriis, et verticatio propria que est inter ipsum
 275 et corpus densum secundum quam comprehendit formam
 coloris illius corporis densi est eadem cum verticatione secun-
 dum quam comprehendit formam secundam venientem ex
 forma coloris orientis super illud corpus, quoniam illa forma
 est in superficie illius corporis. Visus ergo comprehendit ip-
 280 sam ex verticationibus que sunt inter ipsum et illud corpus, et
 ipse comprehendit colorem illius corporis ex verticationibus
 que sunt inter ipsum et illud corpus. Et similiter comprehendit
 visus lucem que est in illo corpore ex illis eisdem verticationi-
 bus. Tres ergo forme venientes ex illo colore ad visum compre-
 285 henduntur a visu ex eadem verticatione.

[6.100] Et cum hoc est, comprehenduntur admixte, et for-
 me secunde que veniunt ad visum ex forma coloris que sunt
 super corpus oppositum illi comprehenduntur a visu semper
 admixte cum forma coloris illius corporis et forma lucis eius.
 290 Ipsum ergo comprehendit ex congregatione duorum colorum
 formam diversam a forma cuiuslibet earum. Si ergo corpus
 densum super quod est forma habuerit fortem colorem, erit
 forma eius que venit ad visum fortis, et est prima forma, et est
 admixta cum secunda forma que venit ad ipsum ex forma

264 apparet: apparuerit R 265 ante alia scr. et del. fuerit P1 267 cum . . . visum
 (270) mg. a. m. E/illo corpore transp. P3 268 post est add. ista R 269 in inter. S/
 eius om. R 271 istius corr. ex ipsius P3 272 post ad add. ipsum EP3R
 273 illud corr. ex istud P1 275 quam: quem P3; quod R 276 coloris om. R/
 coloris . . . formam (277) mg. a. m. S/post verticatione add. sua R 277 quam: quem
 P3/formam: forma P3 279 ergo om. Er 280 corpus om. P1/et² . . . corpus (282)
 mg. a. m. E 281 illius corporis: ipsius EP3R 282 illud om. EP3 284 colore:
 corpore EP3R/visum: visus Er 286 cum . . . comprehenduntur om. R/comprehen-
 duntur admixte corr. ex admixte comprehenduntur Er/ante admixte add. quidem R/
 post admixte scr. et del. item P1 287 secunde om. P3/sunt: est R
 288 comprehenduntur: comprehendunt P1R 289 corporis corr. ex coloris S/post
 et add. cum R 290 ipsum: visus R 291 earum: eorum EP3R 292 densum
 om. R

295 coloris orientis super illud corpus. Et ista forma est debilis,
quare non apparet visui quoniam, quando cum colore debili
fuerit admixtus color fortis, vincet color fortis debilem. Et
similiter inveniuntur semper colores et tincture quando admis-
centur adinvicem. Forma vero coloris non latet quando lux que
300 est super ipsam fuerit fortis nisi quia forma secunda venit ad
visum cum forma lucis fortis et cum albedine corporis.

[6.101] Et iam declaratum est quod lux fortis, quando
venit ad visum, prohibet visum a comprehensione formarum
debilium. Quando ergo veniet ad visum lux fortis cum albedi-
5 ne corporis supra quod est, prohibebit ipsum a comprehensio-
ne secunde forme debilis que venit ad ipsum cum ea. Et si
corpus super quod est forma coloris fuerit album, et lux que
est super ipsum fuerit debilis, et forma etiam coloris que est
super ipsum fuerit debilis, tunc forma lucis que est in illo cor-
10 pore, quamvis sit debilis, cum albedine corporis forte vincet
formam coloris que est valde debilis. Et cum venerit ad visum,
non distinguetur illa forma visui. Et si corpus super quod est
lux fuerit album, et color cuius forma oritur super ipsum fuerit
niger aut obscurus, non eclipsabitur illa forma nisi ab albedine
15 illius corporis tantum; et erit quasi umbra, et comprehendet
visus illud corpus non valde album, sicut comprehendet cor-
pus album in umbra, quare non distinguetur ab eo forma.

[6.102] Et omne hoc erit ita quando lux que est in corpore
colorato fuerit fortis, et forma que oritur ab eo super corpus
20 oppositum fuerit albedinis debilis. Si autem lux que est in
corpore colorato fuerit debilis, tunc forma que exit ex eo super
corpus oppositum erit obscura, et erit apud visum sicuti color-
es quos comprehendit in locis obscuris in quo est lux debilis
valde et quasi colores corporum diafonorum super que oritur

295 coloris *corr. ex lucis P1/orientis: venientis R* 297 *post fortis¹ scr. et del. debilem S; add. ipse scilicet EP3R (inter. a. m. E)/vincet . . . fortis: color . . . vincet P3R/color fortis: calor fortis E (inter. a. m.)* 299 *adinvicem: inter se R/vero: ergo P1/que om. EP3R* 300 *fuerit om. EEP3R/nisi . . . fortis (1) om. R/forma secunda transp. Er*
1 *cum . . . fortis: fortis lucis Er* 2 *quando: cum P1S* 5 *supra: super EP3R/est: cadit R/post est add. cadens EP3/prohibebit: prohibet R* 6 *secunde corr. ex secun-*
dum P3 8 *et . . . debilis (9) mg. a. m. E/etiam om. EEP1P3R/etiam coloris transp. S*
9 *post ipsum add. etiam P1* 11 *valde om. Er* 12 *illa . . . visui: forma illa a visu R*
13 *cuius: cum EEP3R/post forma add. que EEP3R* 14 *eclipsabitur: obscurabitur R/illa corr. ex a. m. E/ab om. EP3R* 15 *comprehendet corr. ex comprehenduntur P1*
16 *sicut: sed P1S/comprehendet: comprehendit ErR* 17 *post album add. ut P1S* 19 *fuerit fortis corr. ex fortis fuerit Er/fortis om. P1/*
forma: formetur P1/oritur ab: exit ex P1S 20 *est corr. ex fuerit p E* 21 *post forma scr. et del. erit Er/exit: erit Er/ex: ab R* 22 *obscura corr. ex obscura a. m. E/sicuti: sicut R* 23 *quo: quibus R/debilis valde (24) transp. R*

- 25 lux debilis. Forme ergo colorum que sunt in corporibus coloratis, quando lux que est super ipsas fuerit debilis, quando oriuntur super corpora opposita sibi, non erunt nisi umbre tantum quoad sensum visus. Et si corpus oppositum colori quod est huiusmodi fuerit in loco obscuro, nichil apparebit super
 30 ipsum propter suam obscuritatem et obscuritatem forme venientis ad ipsum. Et si corpus oppositum isti colori fuerit in illuminato loco, et fuerit super ipsum lux preter lucem illius forme, et fuerit illud corpus illuminatum, apparebit color eius super illam formam; et apparebit visui color istius corporis, et
 35 non apparebit forma, quoniam est sicut umbra, et non distinguetur visui ista diminutio. Et si istud corpus super quod est forma fuerit album et cum hoc fuerit illuminatum cum alio lumine preter lumen forme, tunc forma eclipsabit albedinem istius corporis et lucem eius tantum propter suam obscuritatem,
 40 sicut faciunt umbre in corporibus albis.

[6.103] Et forme que sunt huiusmodi tantum comprehenduntur a visu super corpora opposita coloribus.

- [6.104] Visus ergo non comprehendit formam coloris super corpus oppositum colori nisi quando forma secunda veniens
 45 ad ipsum ex forma coloris fuerit fortior et magis vincens prima forma venienti ad ipsum cum ea ex luce et colore que sunt in corpore super quod est forma. Et iste modus est valde rarus, et propter hoc raro apparet huiusmodi forma, et non apparet ex ea nisi illud quod est ex coloribus fortibus scintillantibus, et
 50 quando lux que est super ipsos colores fuerit fortis, et quando iste forme fuerint super corpora opposite albedinis, et quando lux que est super ista corpora fuerit debilis in respectu illarum formarum. Et quod non est huiusmodi non apparet.

- [6.105] Et similiter lux debilis que non apparet super corpus
 55 oppositum sibi est quia corpus oppositum luci debili, quando fuerit illuminatum ab alio lumine, admiscebuntur due

25 corporibus: coloribus P1 26 ipsas: ipsa EP3R 27 umbre: umbra EP3
 28 corpus om. Er/quod . . . huiusmodi (29) om. R 29 super inter. E 30 obscuritatem et obscuritatem: obscurationem. P1S 31 isti: illi R 33 illud . . .
 illuminatum: istud coloratum Er 34 illam: istam R 36 visui: a visu R
 37 cum hoc: praeterea R/alio corr. ex ergo a. m. S 38 eclipsabit: obscurabit R
 39 obscuritatem corr. ex obscuritatem P3 40 albis: aliis R 41 comprehenduntur (42): comprehenduntur EEP3R 42 coloribus: corporibus P1S 45 fuerit inter. a. m. E/fortior corr. ex fortiori S/magis vincens: potentior R 46 venienti: veniente R/ipsam: ipsam EP3R 49 scintillantibus corr. ex sintillantibus P3/et . . .
 apparet (53) om. R 50 que inter. a. m. E 51 opposite: posite EEP3 53 et om. EP3/huiusmodi rep. EP3; corr. ex huius P1 54 ante lux add. quod R/que om. R
 55 luci: sibi et EP3; loci S 56 post quando scr. et del. e Er

lucis, et sic non distinguetur lux debilis visui. Et cum corpus
 oppositum luci debili fuerit obscurum, non apparebit forma
 lucis debilis super ipsum, quoniam forma lucis est debilior ipsa
 luce, et forma secunda veniens ad oculum ab ista forma, ex
 qua oportet visum comprehendere istam formam super corpus
 oppositum luci, est debilior ista forma. Cum ergo lux fuerit
 debilis et corpus oppositum fuerit obscurum, erit forma que est
 super corpus oppositum valde debilis, et erit forma secunda
 que venit ex illa ad visum in fine debilitatis. Visus autem non
 comprehendit lucem que est in fine debilitatis.

[6.106] Forme ergo omnium colorum illuminatorum et forme
 omnis lucis oriuntur super corpora opposita, et non appar-
 ent plures illarum visui propter causas quas diximus. Et que-
 dam apparent quando fuerint secundum modum quem narra-
 vimus. Iam ergo declarata est causa propter quam non com-
 prehendit visus formas omnium colorum que sunt in corpori-
 bus coloratis super omnia corpora opposita illi, et comprehen-
 dit quasdam, et cum hoc comprehendit omnes colores qui sunt
 in corporibus coloratis. Et causa est quia comprehendit color-
 es qui sunt in corporibus coloratis ex propria forma venienti
 ad ipsum ex eis que est fortior forma secunda venienti ad ip-
 sum ex formis colorum qui sunt super corpora opposita illi. Et
 comprehendit formam colorum etiam singularem non admix-
 tam cum alia, et comprehendit secundam formam provenien-
 tem ad ipsum ex formis colorum earum admixtam cum alia.

[6.107] Et hoc est quod promissimus declarare in fine capi-
 tuli tertii, et declaratum est modo quod colores quos compre-
 hendit visus ex rebus visis non comprehendit ipsos nisi admix-
 tos cum formis lucis que sunt in eis et admixtos cum omnibus
 formis orientibus super ipsos ex coloribus corporum opposito-
 rum. Et si in corpore diafono quod est medium inter ipsos et
 visum fuerit aliqua spissitudo, admiscebitur color eius etiam

57 *post* lucis *add.* debiles *S*/non *om.* *Er*/visui: a visu *R* 58 forma *mg.* *P3* 59 est
om. *EErP3*/est debilior *transp.* *R*/ipsa *om.* *Er* 62 ergo: igitur *P1* 63 erit: exit *P1*
 64 corpus oppositum *transp.* *Er* 65 ad visum *om.* *R* 66 comprehendit:
 comprehendet *P1S* 69 plures: pleraeque *R*/visui *om.* *R* 71 non *om.* *P1P3*
 72 in *om.* *EP3* 73 corpora *om.* *Er*/et . . . quasdam (74) *om.* *Er*/comprehendit (74)
 comprehendet *S* 75 quia *corr.* ex qui *a. m.* *E* 76 ex *inter. a. m.* *E*/venienti: veni-
 ente *EP3R* 77 venienti: veniente *R*; *corr.* ex veniente *E*; venientis *alter. in* veniente *P3*
 79 formam . . . etiam: etiam . . . colorum *EP3R*/formam *corr.* ex formas *a. m.* *E*/etiam: et
Er/singularem *corr.* ex singularem *S* 80 secundam: secundum *P1*/provenientem
 (81): venientem *EP3R*; pervenientem *Er* 81 *ante* ad *scr. et del.* p *S*/earum *om.* *R*
 82 capituli (83): capitis *R*/capituli tertii (83) *transp.* *Er* 83 *post* est *add.* hoc *P1*
 84 ipsos *om.* *R* 87 ipsos: eos *Er*

cum eis, et visus non comprehendit illum colorem singularium.
 90 Sed tamen forme que oriuntur super corpora colorata sunt in
 maiori parte valde debiles, et forme secunde que veniunt ex eis
 ad visum sunt in fine debilitatis. Et propter hoc erunt colores
 corporum ipsorum pluries vincentes super formas orientes su-
 per ipsa. Et similiter si in corpore diafono quod est medium
 95 inter visum et rem visam fuerit modica spissitudo, non distin-
 guetur visui color eius a colore visi venientis cum eo quando
 color visi venientis cum eo fuerit fortior colore illius.

[6.108] Quare vero lux fortis prohibet visum a compreen-
 sione quarumdam rerum visarum est quia forme que veniunt
 100 ad visum super unam verticationem non comprehenduntur a
 visu nisi admixte. Et cum quedam forme admixte fuerint fortis
 scintillationis et quedam debilis, superabit forma fortis for-
 mam debilem, et sic non comprehendetur forma debilis a visu.
 Et cum forme admixte fuerint propinque in fortitudine, com-
 105 prehendentur a visu, et erit comprehensio cuiuslibet illorum
 secundum illud quod admiscebitur cum eis ex formis admixtis
 cum eis, quoniam forme admixte non comprehenduntur a visu
 singulariter sed admixte.

[6.109] Stelle ergo non comprehenduntur a visu in luce diei
 110 quia lux que pervenit in aere est fortior luce stellarum. Cum
 ergo inspicies aspexerit celum in luce diei, erit aer qui est inter
 ipsum et celum illuminatus a lumine solis et continuatus cum
 visu, et erunt stelle ex posteriori illius lucis. Erunt ergo forma
 stelle et forma lucis que est in aere medio inter visum et illam
 115 stellam venientes ad visum super unam verticationem, et sic
 comprehenduntur admixte. Sed forma lucis diei in aere est
 fortior multo forma lucis stelle, quare superabit lux aeris lucem
 stelle, et sic non distinguetur forma stelle.

89 comprehendit: comprehendet *S*/singularium: singularem *R* 90 que: qui *S*
 93 corporum ipsorum *transp. EP3R*/pluries: plerunque *R*/vincentes: venientes *EERP3*/
 vincentes . . . orientes: fortiores formis orientibus *R*/orientes *inter. a. m. E* 94 est *om.*
P1/medium *om. P1RS* 96 visui: a visu *R*/color eius *om. EP3*/visi: nisi *P1*; *corr. ex*
 visu *S* 97 illius *corr. ex illis a. m. S* 98 prohibet: prohibeat *R* 100 com-
 prehendentur: comprehenduntur *Er* 101 forme . . . fuerint: sit forma *P1S*
 104 comprehenduntur (105): comprehenduntur *Er* 105 illorum: illarum *R*
 106 admiscebitur: permiscebitur *EP3R* 107 forme *om. P1* 109 stelle: selle *E*/
post diei add. nisi EERP3 110 quia . . . diei (111) *mg. a. m. S*/aere: aerem *R*
 111 qui: quod *ErP1S* 112 illuminatus: illuminatum *P3*; *corr. ex illuminatorum P1*/
 lumine: luce *EP3R*/continuatus: continuatur *R* 113 visu: visum *Er*/erunt²: erit
ErP1S; venient *R*/forma stelle (114) *transp. EP3* 114 *post et² scr. et del. rem visam P1*/
 illam *om. EERP3R* 115 venientes *om. R* 116 comprehenduntur: compreen-
 duntur *Er*/forma: forme *P3*/diei *om. EERP3*/*post diei add. vel S (inter. a. m.)*/in aere
inter. a. m. S/in aere est: est in aere *EERP3R*

[6.110] Et similiter lux debilis que est in medio fortis lucis—
 120 sicut ignis debilis in luce solis, et sicut noctiluca in luce diei, et
 sibi similibus; ista visibilia quando fuerint in luce solis aut diei,
 venient forme eorum ad visum admixte cum forma lucis fortis
 orientis super ipsas. Et comprehendet visus formam huius-
 modi rerum visarum admixtam cum forma lucis fortis, quare
 125 superabit forma lucis fortis super formam debilem.

[6.111] Et multotiens latet lux debilis et forma rei vise de-
 bilis quando pervenerit in visum lux fortis, quamvis non sit
 perventus duarum formarum ad visum ex una verticatione. Et
 hoc erit quando perventus duarum formarum fuerit ex duabus
 130 verticationibus vicinantibus et pervenerit in visum in duabus
 partibus vicinantibus. Et hoc apparet nocte in luce ignis, quo-
 niam visus, quando comprehenderit lucem ignis, et fuerit ignis
 propinquus visui, et fuerit lux eius fortis, et fuerit in oppositi-
 one visui in illa dispositione aliquod visibile in quo est lux de-
 135 bilis accidentalis, et fuerit illud visibile remotius a visu igne, et
 fuerit super verticationem vicinam verticationi ignis et pro-
 pinquum verticationi ignis, tunc visus non comprehendet illud
 visibile comprehensione vera. Et si aspiciens cooperuerit ig-
 nem a suo visu aut removerit se a verticatione ignis ita quod sit
 140 verticatio a qua comprehendit illud visibile remota a verticati-
 one ignis, tunc comprehendet illud visibile comprehensione
 manifestiore.

[6.112] Et causa illius est quod visibile in quo est lux debi-
 lis accidentalis habet formam obscuram, et cum ipsam com-
 145 prehenderit visus et non comprehenderit cum ea lucem fortem,
 sentiet lucem debilem in quo est aliquid obscuritatis inter vi-
 sum aut privationem lucis fortis a parte eius in quam pervenit
 forma lucis debilis. Et cum visus comprehenderit formam lucis
 debilis et comprehenderit cum ea lucem fortem, tunc etiam

119 *post lux add. est R/fortis lucis transp. EP3* 120 *luce¹ corr. ex aere E* 121 *sibi om. R/sibi similibus transp. EP3/post ista add. enim R* 122 *venient: veniet Er/fortis om. P3* 123 *formam corr. ex formas P1* 126 *ante et² scr. et del. fortis P1*
 130 *et . . . vicinantibus (131) om. P1P3R; scr. et del. E/in duabus om. Er* 131 *post nocte add. et EErP3R* 134 *visui: visus R; corr. ex visus P1/aliquod: ad EP3* 135 *igne: quam ignis R* 136 *verticationi corr. ex verticationem P3/et . . . ignis (137) om. R*
 137 *ignis: igni P3; corr. ex igni a. m. E/illud visibile (138) transp. R* 138 *ignem (139): igne P3* 139 *suo visu transp. P3/removerit: removebit P3; corr. ex removebit a. m. E/quod: ut R* 140 *comprehendit: comprehendet EP3R/illud visibile corr. ex visibile illud Er/remota . . . visibile (141) om. Er* 144 *cum inter. E/comprehenderit (145): comprehendit EP3* 145 *et non: non autem EP3R* 146 *quo: qua P1R*
 147 *ante aut scr. et del. et i P1/aut om. S* 148 *forma om. EP3/lucis¹: lux EP3/comprehenderit: comprehendit P1S* 149 *etiam: et EP3*

150 comprehenderit lucem fortem in parte ipsius contingenti par-
tem qua comprehendebat formam obscuram. Non comprehen-
det visus lucem debilem que est in forma obscura propter duo:
quorum unum est quod lux fortis, quando pervenerit in visum,
illuminatur totus visus, et cum totus visus fuerit illuminatus,
155 non apparebit in eo lux debilis, et maxime quando lux debilis
fuerit proportionis minime respectu lucis fortis; et alterum est
coniunctio lucis debilis cum luce forti in duabus partibus vici-
nantibus visus. Et lux debilis respectu lucis fortis est fere ob-
scuritas, et cum lux vicinabitur ad formam obscuram debilem,
160 et forma lucis fortis fuerit in visu, non comprehendet visus for-
mam que est in luce obscura, nec comprehendet etiam formam
obscuram nisi obscuritatem tantum; et sic non distinguetur ab
eo forma, nec comprehendet eam comprehensione vera.

[6.113] Et occultatio formarum debilis lucis propter vicini-
tatem lucis fortis habet simile in coloribus, quoniam color fus-
cus, quando intinguetur cum eo corpus album punctatim, punc-
ta apparebunt nigra propter fortitudinem albedinis. Et si ead-
em puncta fuerint posita super corpora valde nigra, apparent
fere alba, et non apparebit obscuritas que est in eis. Et quando
170 illa tinctura fuerit in corporibus que non sunt multum alba nec
multum nigra, apparebit color secundum suum esse.

[6.114] Et similiter quando color viridis segetalis fuerit
super corpus citrinum, apparebit illa tinctura obscura; et
quando fuerit in corpore nigro, apparebit illa tinctura similis
175 colori origani, et similiter omnis tinctura media inter duas
extremitates.

[6.115] Visibilia ergo vicinantia quando fuerint remota in
fortitudine et debilitate coloris, quod est debilis coloris latebit
visum, quoniam qualitates lucis et coloris non comprehenden-

150 comprehenderit: comprehendit EP3; comprehendet R/ipsius om. EErP3R/contingenti: contingente R 151 ante qua add. visus EErP3R/qua: et Er; quia S/obscuram corr. ex obscur P3 152 ante visus add. autem R 153 quando: cum P3/in: ad R 154 totus¹ corr. ex totius S/cum inter. E 155 quando om. E; si P3 (inter. a. m.) 156 post fuerit add. debilis Er/et om. R/post et add. aliquando EP3 (mg. a. m. E)/alterum: altera EP3 157 vicinantibus visus (158) transp. EP3R 158 post et add. quia R 159 vicinabitur: appropinquabit R 160 comprehendet: comprehendit EErP3 161 nec . . . obscuram (162) om. P3; scr. et del. E/comprehendet: comprehendetur EEr/etiam om. Er/formam obscuram (162): forma obscura EEr 162 post nisi add. in EEr/obscuritatem: obscuritate EErP3/ab eo forma (163): forma ab eo Er 164 propter . . . lucis (165) mg. a. m. S 166 quando: si R/intinguetur: intingetur EP3 (alter. ex intingetur a. m. E); intingatur R/cum eo: super P3/eo . . . album: corpore albo R/puncta (167) om. EP1RS 167 ante nigra add. ipsa puncta R 168 super: supra R/apparent: apparebunt EP3R 172 similiter corr. ex super P3/color corr. ex corpus S 175 ante omnis add. est R 178 debilis coloris transp. P3 179 comprehenduntur (180): comprehenduntur EP3

- 180 tur a visu nisi ex respectu eorum adinvicem. Et lux fortis non
prohibebit visum a comprehensione visibilium lucis debilis nisi
propter admixtionem forme lucis debilis cum formis earum, et
propter victoriam formarum lucis fortis super formas lucis de-
bilis, et debilitatem sensus ad comprehendendum illud quod
185 est minime proportionis respectu fortis.

[6.116] Iam ergo complevimus declarationem omnium
rerum dependentium ab isto capitulo.

[CAPITULUM 8]

[7.1] Tunice quas diximus in declaratione forme visus sunt
instrumenta per que completur visio.

- [7.2] Tunica vero prima, que dicitur cornea, est tunica dia-
fona et cum hoc fortis, et est superposita foramini quod est in
5 anteriori uvee. Et prima utilitas eius est quia cooperit foramen
uvee, quare retinet humorem albugineum quod est in anteriori
uvee. Et est diafona ut transeant in ea forme lucis et coloris
ad interius visus, quoniam non transeunt nisi per diafona.
Fortitudo autem eius est ut non corrumpatur cito, quoniam est
10 exposita aeri et potest cito corrumpi ex fumo, et pulvere, et
sibi similibus.

- [7.3] Humor autem albugineus est diafonus, et est hic hu-
midus fluxibilis. Diafonitas autem est ut pertranseant in eo
forme et perveniant in eo ad humorem glaciale. Humiditas
15 autem eius est ut semper humefaciat humorem glaciale, ita ut
eius natura sit custodita, quoniam tela que est super glaciale
est valde tenuis, et minima siccitate poterit corrumpi.

- [7.4] Tunica autem nigra continens humorem albugineum,
que est uvea, est nigra, et fortis, et spissa, et spherica, et in an-
20 teriori eius est foramen rotundum, sicut narravimus. Nigredo

180 ex om. R/adinvicem: inter se R 181 post debilis add. lucis P3 182 admix-
tionem corr. ex admixtione S/forme mg. a. m. E/post debilis add. et fortis EP3/ante cum
add. vel mg. a. m. E/cum formis om. P3; mg. a. m. E/earum: eorum EP1P3R 183 post
victoriam add. lucis S/formarum om. Er/lucis . . . lucis mg. a. m. E 184 sensus: vi-
sus P1; lucis debilis S 187 isto: illo P3R 1 sunt: sicut Er 2 instrumenta corr.
ex instrumentum E 4 cum hoc: nonihil R/ante est¹ scr. et del. s Er/superposita: sup-
posita P1; superpositata P3 5 ante uvee add. tunice P3/post eius scr. et del. eius S/
quia: quod EP3R 6 uvee corr. ex uve S/quare . . . uvee (7) om. Er/quare: quarum P3/
quod: qui R; alter. in. qui EP3 (a. m. E)/est om. EP3 9 eius est corr. ex est eius P3
10 exposita: opposita Er 11 sibi om. ErR/sibi similibus transp. EP3 12 albugi-
neus: albuginens Er/hic om. R 13 ante fluxibilis add. et R/diafonitas: diafonus P3R
15 ita: prima S 16 natura: non P3/custodita: custodia ErS 17 minima: nimia
R/poterit: potest R 18 humorem corr. ex humor a. m. P3 19 et² om. R

vero eius est ut obscuretur humor albugineus et glacialis ita
quod appareant in ea forme lucis debilis, quoniam lux debilis
valde apparet in locis obscuris et latet in locis luminosis. Et
est aliquantulum fortis ut retineat humorem albugineum et ut
25 non resudet ex eo aliquid ad exterius. Et est spissa ut sit ob-
scura, quoniam si esset rara, esset diafona; et cum erit spissa,
obscurabitur anterior pars eius. Et est sperica quia est magis
temperata figurarum, et est magis remota ab occasionibus, et
habens angulos citius alteratur per angulos. Foramen autem
30 quod est in anteriori istius tunice est ut pertranseant ipsam
forme ad interius visus, et est rotundum quia rotunditas est
simplicior figurarum et amplior ysoperimetricorum.

[7.5] Humor autem glacialis habet multas proprietates per
quas completur sensus. Quoniam est humidus et subtilis, et
35 est in eo aliquid diafonitatis et spissitudinis. Et super ipsum
est tela valde rara, et figura superficiei eius est composita ex
duabus superficiibus spericis diversis, et anterior illarum est
maioris spericitatis altera. Est autem humidus ut citius pati-
atur a luce, et est subtilis quia talia corpora sunt subtilis sen-
40 sus. Et est aliquantulum diafonum ut recipiat formas lucis et
coloris et ut pertranseant per ipsum lux et color, et est ali-
quantulum spissus ut remaneant in eo diu forme lucis et coloris
ita quod appareat virtuti sensibili forma lucis et coloris que
figebantur in eo. Et si esset diafonum in fine diafonitatis, per-
45 transirent forme in eo, et non pateretur a formis passione que
est ex genere doloris, et sic non comprehenderet formas.

[7.6] Tela autem que est super istum humorem est ut re-
tineat ipsum quatinus non fluat, quoniam humores nisi retine-
rentur aliquo, fluerent et non remanerent secundum unam figu-
50 ram. Et ista tela est valde rara ut non occultet formas venien-
tes. Et est sperica propter causam quam diximus, et superfici-
es anterioris eius est ex spera maiori ut sit equidistans super-

21 eius *om.* S 22 quod: ut P3R/ea: eis R 23 luminosis *corr.* ex luominosis P3
24 retineat: retinae Er 25 resudet *corr.* ex restidet a. m. Er/ad exterius: foras R/est
om. P1 26 et cum erit: sed cum fuerit R/cum *inter.* a. m. E 27 anterior . . . eius:
anteriorius Er/anterior pars *transp.* EP3/quia *om.* Er/est² *om.* EP3R/post est² *add.*
enim Er 28 ante et¹ *add.* est sperica EP3R/et² *om.* R 29 post habens *add.* enim R
30 est¹ *om.* EP3/pertranseant: transeant Er 31 forme *inter.* a. m. E 32 simplicior:
simplicissima R/amplior: amplissima R/ysoperimetricorum: isoperimetricarum R
36 superficiei: superficies S 38 spericitatis: speritatis EErP3 40 diafonum:
diaphanus R 43 quod: ut R/appareat: apparet Er/que: qui Er 44 figebantur:
figebantur E/et: nam R/diafonum: diaphanus R 48 quatinus non: ne R/nisi:
non R 49 ante aliquo *add.* sed R/remanerent: remanebunt Er;*corr.* ex remearent a. m.
E;*corr.* ex remanent S/figuram (50) *corr.* ex formam S 50 occultet *corr.* ex occultat P1

ficiei anteriori visus, ita quod centra illarum sit unus punctus.

[7.7] Nervus autem obticus super quem componitur oculus
 55 totus est obticus ut currat per ipsum spiritus visibilis a cerebro, et perveniat ad glaciale, et det ipsi virtutem sensibilem successive, et ut pertranseant etiam forme in corpore subtili currenti in suo concavo quousque perveniant ad ultimum sentiens quod est in anteriori cerebri.

60 [7.8] Et principia duorum nervorum super quos componuntur oculi duo sunt in duabus partibus anterioris cerebri ut situs duorum oculorum a suis duobus principiis sit situs consimilis. Et non fuit principium eorum a medio anterioris cerebri, quia iste locus est proprius sensui ordinatus.

65 [7.9] Quare enim fuerint duo oculi est benignitas operatoris ita quod, si uni illorum accideret occasio, remaneat alter, et ut forma faciei sit etiam pulcrior.

[7.10] Causa autem propter quam concurrunt isti duo nervi iam fuit dicta in qualitate visionis.

70 [7.11] Superficies vero tunicarum oculi sunt sperice et equidistantes, et centrum illarum est unum punctum ita quod perpendicularis que est super primam illarum est perpendicularis etiam super omnes. Et sunt sperice ut exeant omnes perpendiculares ab uno puncto quod est centrum illarum, deinde dis-
 75 tent apud extremitates secundum remotionem a centro ita quod piramis extensa a centro contineat omnes perpendiculares exeuntes ab illa re visa et distinguat ex superficie visus et membri sentientis partem parvam continentem, quamvis sit parva, totam formam venientem a re visa ad visum. Et si
 80 superficies tunicarum visus essent plane, non veniret forma visi ad visum super perpendiculares nisi esset visus equalis viso. Et nulla figura est in qua adunantur perpendiculares et concurrunt in unum punctum eius, et est superficies super quam elewantur equalis ordinationis, nisi figura sperica.

53 quod: ut R/unus punctus: unum punctum R 55 obticus: cavus R 56 ipsi:
 ipsum EP3 58 currenti: corrente EP3R/suo om. P3 62 situs¹: sicut P1/duobus
 om. R 65 fuerint: sint R/duo oculi transp. P3 66 ita quod: ut R/illarum: eorum
 Er/occasio: interitus R 67 sit: esset R/etiam om. EP3R 68 concurrunt:
 concurrant R 71 post centrum add. etiam P1S/quod: ut R 72 ante que scr. et del.
 etiam super omnes S/esf²: sit R 73 etiam: et P1; om. Er/omnes² om. ErS/perpendic-
 ulares (74) om. EP3R 75 post secundum scr. et del. quod P1 76 quod: ut R/a
 centro om. P1S 78 post partem add. licet R/quamvis sit parva (79) om. R 79 sit
 rep. P1/post parva add. tamen R/ante a add. quod P3/si corr. ex situm P1 81 visi om.
 EP3; corr. ex visus P1/esset: essent P3 82 viso corr. ex visio Er 83 concurrunt:
 concurrent S/eius . . . ordinationis (84) om. R/est superficies transp. EP3/superficies
 super corr. ex super superficies Er 84 elewantur: elevatur EP1P3

85 [7.12] Et cum ista dispositione possunt exire a centro visus
 multe piramides ad multa visa in eodem tempore, et quelibet
 illarum distinguet partem parvam superficiei membri sentientis
 continentem formam illius visi. Et omnes tunice habent unum
 centrum propter illud quod prediximus, et est ut perpendicu-
 90 lares exeuntes a re visa ad unam illarum sint perpendiculares
 super omnes et ut pertranseant etiam forme omnes secundum
 unam verticationem.

[7.13] Quare vero nichil comprehendit visus ex rebus visi-
 bilibus nisi ex verticationibus istarum perpendicularium tan-
 95 tum est quia per istas perpendiculares tantum ordinantur par-
 tes vise rei in superficie membri sentientis. Et hoc fuit iam
 manifestum ante quoniam non potest ordinari forma rei vise in
 superficie membri sentientis nisi sit receptio eius ad formam ex
 istis verticationibus tantum. Et propter hoc appropriatur na-
 100 tura visus ista proprietate, et naturatur quod non recipiat
 aliquam formam nisi secundum situm istarum verticationum
 tantum. Et appropriatio visus habita hac proprietate est una
 rerum ex quibus apparet maxima discretio operatoris et boni-
 tas preparationis nature in preparando instrumenta visus et
 105 formam per quam completur sensus et per quam distinguuntur
 visibilia.

[7.14] Consolidativa autem continet omnes istas tunicas;
 et in ea est aliquid humiditatis, et cum hoc habet aliquid reten-
 tionis, et est aliquantulum fortis. Et continet istas tunicas ut
 110 congreget et conservet illas, et est aliquantulum humida ut pre-
 parentur loca tunicarum ex ea et ut non accidat siccitas veloci-
 ter illis tunicis. Et est aliquantulum retentiva et fortis ut con-
 servet situs et figuras tunicarum ut non alterentur cito. Et est
 alba ut sit per ipsam forma faciei pulchra.

115 [7.15] Et totus oculus est rotundus quoniam rotunditas est
 melior figurarum et maior et levioris motus. Oculus autem in-
 diget motu et velocitate motus ita quod sit oppositus per mo-

86 multe piramides *mg. a. m. E* 87 superficiei *om. EP3R* 88 unum: idem *EP3R*
 89 prediximus: diximus *EP3R/ut om. Er* 90 illarum: istarum *R/ante sint add. ut*
EP3 (mg. a. m. E)/sint: sit P1S/perpendiculares: perpendicularis EP1P3S 93 com-
 prehendit: comprehendat *R* 96 vise rei *transp. EP3R/fuit iam transp. Er/iam om. P3*
 97 ante: antea *R/ante quoniam: antequam S* 100 quod: ut *R* 102 hac *om. ErS*
 103 operatoris: operationis *Er* 104 in *om. EP3R* 105 completur *corr. ex*
copulatur P1 107 omnes *om. P1* 108 cum hoc: praeterea *R* 109 post et² *add.*
continet P3 110 conservet: conservaet *P3; conservat S/illas: ipsas Er; om. P1/*
parentur (111): prepararentur S 111 ut *om. P1* 114 ipsam: ipsum *S/post*
faciei scr. et del. alba P1 115 quoniam rotunditas *inter. a. m. S* 116 figurarum:
figuris R/post et² scr. et del. letus oculus S 117 quod: ut *R/oppositus ... sit (118) mg.*
a. m. S

tum multis visibilibus in eodem tempore, et ut sit oppositus propter motum omnibus partibus rei vise medium aspicientis
 120 ita quod comprehendat ipsum comprehensione vera et cum hoc consimili, quoniam sensus per medium membri sentientis est manifestior (et hoc declarabimus post in loco convenienti). Velocitas autem motus visus est ut sit aspiciens omnes partes rei vise et visibilia sibi opposita in modico tempore.

125 [7.16] Palpebre autem sunt ut conservent oculum apud sompnum et ut faciant oculum quiescere quando fatigatur a lumine, quoniam luces fortes nocent oculis, et si continue aperirentur oculi supra modum, debilitarentur. Et hoc apparet quando oculi aspiciunt lucem fortem longo tempore. Et similiter nocet visui aer quando in eo fuerit fumus aut pulvis. Palpebre ergo cooperiunt oculum a luce, quando indigent hoc, et conservant ipsos ab aere, et abstergunt ab eis multa nocumenta. Deinde quando fatigantur, superponuntur palpebre ita quod completur in eis sua requies, et sunt velocis motus ut
 130 citius superponantur oculis apud appropinquationem nocumentorum oculis.

[7.17] Cilia autem sunt ad temperandam quandam partem lucis quando dolebit visus propter fortitudinem lucis, et propter hoc adunat aspiciens oculum suum et constringit ita quod
 140 possit aspicere ab angusto quando lux fortis nocuerit ei.

[7.18] Ista ergo que diximus sunt utilitates instrumentorum visus ex quibus manifestatur magna discretio operatoris. Sit ergo nomen eius benedictum et bonitas preparationis nature.

[CAPITULUM 9]

[8.1] Iam ergo declaratum est superius quod visus nichil comprehendit ex rebus visis que sunt cum eo in eodem aere (ita

118 oppositus: oppositum *ErS* 119 aspicientis: aspiciens *EP3R* 120 quod: ut *R/cum hoc (121) om. R* 122 est *om. P3/convenienti: conveniente R; corr. ex venienti Er* 123 sit aspiciens: aspiat *ErR* 125 apud sompnum (126): in somno *R* 127 quoniam: quando *Er/continue corr. ex continuem P1* 130 aut *corr. ex autem S* 131 cooperiunt *corr. ex coperiunt P3/quando: quoniam S/indigent: indiget EEP3R* 133 quando: quoniam *P1S/ante ita add. eis EP3R* 134 quod completur: ut compleatur *R* 135 superponantur: superponuntur *P3/post oculis scr. et del. propinquitationi S/apud ... nocumentorum (136): dum appropinquant nocumenta R* 138 post lucis¹ *scr. et del. et propter hoc S/dolebit corr. ex dolebis P1S/propter: per Er* 139 post oculum *scr. et del. o Er/suum om. EP3R/quod: ut R* 140 post fortis *scr. et del. fo S* 143 post ergo *scr. et del. est declaratum superius quod visus nichil comprehendit ex rebus S* 1 declaratum est *transp. S/nichil om. P1*

quod comprehensio eorum ab eo non sit secundum reflexio-
nem) nisi quando aggregabuntur iste res, et sunt: [1] ut sit in-
ter ea aliquid spatii, [2] et ut sit opposita visui illa res--scilicet
5 ut sit inter quodlibet punctum eius superficiei quam compre-
hendit visus et inter aliquod punctum superficiei visus linea
recta ymaginabilis, [3] et ut sit in ea lux, [4] et ut sit corpus
eius aliquantulum in respectu virtutis sensus visus, [5] et ut sit
10 aer medius diafonus continue diafonitatis, et ut non sit in eo
aliquod corpus non diafonum, [6] et ut sit res visa resistens
visui--scilicet ut non sit in ea diafonitas, aut si sit, sit spissior
diafonitate aeris medii inter ipsam et visum; sed tale non po-
test esse nisi cum colore aut eius simili. Visus autem non com-
prehendit rem visam nisi quando congregabuntur iste sex in-
15 tentiones, et si res visa caruerit istarum una intentionum, non
comprehendetur a visu.

[8.2] Indigentia autem visus ab unaquaque istarum intenti-
onum non est nisi propter aliquam causam.

20 [8.3] Quare ergo non comprehendit visus rem visam nisi
quando inter ea fuerit distantia aliqua, et non comprehendit
ipsam quando applicabitur ei est propter duas causas, qua-
rum una est quod visus non comprehendit rem visam nisi
quando fuerit in ea aliqua lux. Et quando fuerit applicata
25 visui et non fuerit illuminata per se, non erit in sua superficie
vicinanti visui lux, quoniam corpus oculi secundum situm su-
um tunc prohibetur a visu. Res autem lumine per se non
possunt applicari superficiei visus, quoniam res illuminate per
se sunt stelle et ignis que non possunt applicari superficiei vi-
30 sus. Causa autem secunda est quod visio non erit nisi ex parte
opposita foramini uvee ex medio superficiei visus, et cum res

3 quod: ut R/eorum: earum R/reflexionem (4): refractionem R 4 post quando scr.
et del. comprehensio S/aggregabuntur: aggregatae fuerint R 5 ut om. R/sit om. P1/
scilicet: ita R; et EP3 6 post ut scr. et del. inter Er/eius superficiei transp. Er/quam:
quem P3 7 aliquod: aliud R/visus² corr. ex eius E 8 ut² om. ErP1S 9 post
eius add. id est rei vise EP3/aliquantulum: aliquantum Er/visus corr. ex eius E/post et
add. ut R 10 et... diafonum (11) om. S/ut om. R 11 aliquod: aliquid P1; ad P3;
aliud R 13 sed... simili (14) om. R 14 comprehendit (15): comprehendit ErP1
15 quando om. P3/congregabuntur: aggregabuntur EP3R 16 istarum una transp.
R/intentionum: intentione P1S 17 comprehendetur: comprehende E; comprehen-
det P3 18 intentionum (19): intentionem Er 20 comprehendit: comprehen-
dat R 21 fuerit: fuit P1S/comprehendit: comprehendat R 22 post ipsam add.
rem P1S/applicabitur: applicatur R 23 quod: quia R/post rem scr. et del. rem P1
24 fuerit in ea: in ea fuerit R/in: inter ErP1S/aliqua lux transp. EP3R/fuerit applicata
transp. Er 26 vicinanti: vicinante R 28 applicari... visus: superficiei...
applicari Er 30 causa... visus (31) mg. a. m. S/quod: quia R/erit: fit R 31 cum:
si R

visa applicabitur visui, non superponetur isti parti visui nisi
 pars equalis illi tantum ex re visa. Et si visus comprehendet
 rem visam per applicationem, non comprehendet nisi partem
 35 applicatam parti opposite foramini tantum, et non compre-
 hendet residuum rei vise. Et si moveatur res visa super super-
 ficiem visus quousque contingat totam superficiem rei vise
 secundum partem mediam visus, comprehendet partem post
 aliam, et dum comprehendet partem secundam non compre-
 40 hendet partem primam, et sic non poterit comprehendere to-
 tam rem in simul. Et cum ita est, non figurabitur in eo forma
 rei vise ita quod, si aliqua res visa esset super corpus densum
 et esset in illo corpore denso foramen minoris quantitatis re
 vise, et res visa esset applicata foramini, non comprehenderet
 45 ex ea nisi partem superpositam foramini tantum. Deinde si
 res visa moveatur super foramen quousque comprehendatur a
 visu pars post aliam, non figuratur in visu tota forma eius.

[8.4] Si ergo visio esset per contactum, non comprehende-
 ret visus totam rem visam nec figuram et formam eius nisi
 50 esset res visa equalis parti medie superficiei visus per quam
 erit visio, et cum hoc non potest comprehendere res visas mul-
 tas in eodem tempore. Et cum inter visum et rem visam fuerit
 aliquod spatium, poterit comprehendere totam rem visam in
 eodem tempore ex aliqua parte parva, quamvis res visa sit
 55 magna; et potest comprehendere res visas multas simul in eo-
 dem tempore. Et cum res visa fuerit remota a visu erit possi-
 bile lucem oriri super superficiem eius oppositam visui. Prop-
 ter ergo istas duas causas non comprehendit visus ex rebus
 visibilibus nisi sit inter eos aliquod spatium.

60 [8.5] Quare vero non comprehendit visus rem visam que
 est cum eo in eodem aere et in parte opposita illi nisi sit inter

32 applicabitur: applicetur R 33 comprehendet: comprehenderet EP3R
 34 comprehendet: comprehenderet R 35 applicatam corr. ex oppositam a. m. E/
 opposite: apposite P1; corr. ex applicate a. m. E/comprehendet (36): comprehenderet R
 38 post post add. partem EP3R 39 comprehendet': comprehendit Er 40 post
 partem add. ipsam P3 41 post rem add. visam EP3R/in' om. R/est: sit EP3R
 42 quod: ut R/post res add. esset EP3 44 vise: visa Er/res: re Er 45 super-
 positam: suppositam EP3RS/foramini inter. a. m. E/si corr. ex non S 47 pars om. P3
 48 contactum: tactum R 51 et . . . non: nec etiam sic R/res . . . comprehendere (53)
 mg. a. m. S/res . . . multas (52): multas res visas R/res (?) S 52 ante rem add. inter
 EP3/rem (?) S/visam om. P1 53 comprehendere . . . visam: rem visam comprehen-
 dere R/visam om. ErS 54 ante ex add. totam R/aliqua om. EErP3R/parte parva
 transp. P1/parva om. S/res visa sit: sit res visa EP3R 56 visa fuerit corr. ex fuerit visa
 P3/fuerit: fuit Er 57 lucem om. Er/lucem oriri transp. EP3R 58 ergo istas; istas
 igitur R/ante ex add. quicquam R 59 eos: ea R/aliquod corr. ex ad P3
 60 comprehendit: comprehendat R 61 post et scr. et del. tempore P1

quodlibet punctum eius et aliquod punctum superficiei partis
per quam erit visio ex superficie visus linea recta est quia de-
claratum est quod visio non erit nisi ex formis venientibus a re
65 visa ad visum, et quod forme non comprehenduntur nisi se-
cundum lineas rectas. Et propter hanc causam non compre-
hendit visus rem nisi sit inter ea linea recta. Et si secuerint
densa media corpora omnes lineas que sunt inter ea, latebunt
res vise visum, et si secuerit illud corpus quasdam illarum
70 linearum rectorum, latebit visum quedam pars que est apud
extremitatem linearum resectorum per corpus densum.

[8.6] Quare vero visus non comprehendit rem visam nisi sit
in ea lux est propter duas causas: aut quia forme coloris que
sunt in rebus visis non extenduntur in aere nisi sit lux cum co-
75 lore, aut quia forma coloris extenditur in aere, quamvis non sit
cum ea lux, sed non operatur in visum operatione sensibili nisi
per lucem. Et manifestum est quod forma lucis est fortior for-
ma coloris, et quod lux operatur operatione manifestiori, et
quod forma coloris, quia est debilis, non potest operari in vi-
80 sum sicut operatur lux. Et forma coloris que est in corpore il-
luminato semper est admixta cum forma lucis, et cum perve-
nerit ad visum, operatur in ipsum per suam fortitudinem et
preparationem visus ut patiatur ex ea. Et quia admiscetur
cum forma coloris et non distinguitur ab ea, non sentit visus
85 formam lucis nisi admixtam cum forma coloris. Visus ergo non
sentit colorem rei vise nisi ex colore admixto cum forma lucis
veniente ad ipsum ex re visa, et propter hoc alterantur colores
multarum rerum visarum apud visum per alterationem lucis
orientis super ipsas. Quia ergo forma coloris non operatur in
90 visum nisi sit admixta cum lumine, et non sit ex colore forma
nisi sit in ea lux, nichil comprehendit visus ex rebus visibilibus
nisi quando in ea fuerit aliqua lux.

[8.7] Quare vero non comprehendit visus rem visam nisi sit

62 superficiei partis: partis superficiei visus R 63 ex . . . visus om. R 64 erit:
sit R 65 comprehenduntur: comprehendantur R 66 comprehendit (67):
comprehendet S 67 post visus scr. et del. nisi E/post rem add. visam EP1 (scr. et
del E) 68 densa media om. Er/densa . . . corpora: corpora . . . media EP3R/media
inter. a. m. E 70 linearum om. Er 71 resectorum: rectorum ErS 72 com-
prehendit: comprehendat R; comprehendet S 73 coloris . . . rebus (74) om. R
74 visis: vise R 77 est fortior: manifestior est R 79 quod: quia Er/quia
om. EErP3 81 ante lucis scr. et del. co P1 82 post visum add. semper EP3R
84 non¹ om. S 86 post sentit scr. et del. visus formam Er/cum forma om. P1
88 apud visum om. P1/lucis orientis (89) transp. EP3 89 orientis om. R/post non scr.
et del. a S 90 sit admixta transp. EP3R/lumine: luce Er/sit²: fit ErP1; est R
93 vero om. P1/comprehendit: comprehendat R

corpus eius aliqua quantitate est quia declaratum est quod
 95 forma rei vise non pervenit ad visum nisi ex pyramidibus cuius
 caput est centrum visus et basis superficies rei vise et quod
 ista pyramis distinguit ex superficie membri sentientis parvam
 partem in qua ordinabitur forma rei vise. Et si res visa fuerit
 valde parva, erit pyramis que est inter ipsam et centrum visus
 100 valde parva. Erit igitur pars distincta ex membro sentiente
 quasi punctum valde parva. Sed sentiens non sentit formam
 nisi quando pars sue superficiei ad quam pervenit forma fuerit
 quantitatis sensibilis respectu totius. Et virtutes sensus etiam
 sunt finite, et cum pars membri sentientis ad quam pervenit
 105 forma non est quantitatis sensibilis apud totum membrum sen-
 tiens, non sentiet passionem que accidit in illa parte propter
 parvitatem ipsius, quare non comprehendit formam. Res ergo
 visa que est possibilis comprehendi a visu est illa in qua erit
 pyramis que figuratur inter visum et centrum visus distinguens
 110 ex superficie glacialis partem quantitatis sensibilis respectu
 totius superficiei glacialis. Et iste sensus erit secundum tan-
 tum ad quantum pervenit virtus sensitiva, et non extenditur ad
 infinitum, et diversatur etiam secundum diversitatem virtutis
 oculi. Et cum pyramis que figuratur inter rem visam et centrum
 115 visus est distinguens ex superficie glacialis partem quantitatis
 insensibilis respectu totius superficiei glacialis, non potest vi-
 sus comprehendere illam rem. Et propter hoc non comprehen-
 det rem visam visus valde parvam.

[8.8] Quare vero non comprehendit visus rem visam nisi
 120 quando corpus medians inter ipsam et visum fuerit diafonum
 est quia visio non est nisi ex forma venienti ex re visa ad vi-
 sum. Forme autem non extenduntur nisi in corporibus diafo-
 nis, et visio non completur quando res visa fuerit cum visu in

94 *post eius add. in EP1P3R/quod: quia EP3* 95 *pervenit: perveniat R/cuius:*
cuiusmodi EP3; quarum R 97 *distinguit: distinguat R* 98 *ordinabitur:*
ordinatur R 99 *pyramis corr. ex pyramis P3/ipsam: ipsum EP1P3* 100 *erit*
igitur transp. Er/igitur: ergo R/post pars scr. et del. parva P3 103 *post sensibilis scr.*
et del. ro Er/ante et add. apud totum membrum EP3R (mg. a. m. E) 104 *post membri*
add. etiam P1S 106 *post que add. illi R/in illa parte om. R* 107 *parvitatem:*
permutationem EP3 108 *est possibilis: potest R/erit om. R* 109 *post visum add.*
et rem visam P1S/distinguens: distinguet R 111 *secundum om. S* 113 *et inter.*
S/etiam om. EP1P3R 114 *cum: si P3 (inter.)* 115 *est: fuerit EEP3/est*
distinguens: distinxerit R 117 *illam rem transp. P3/post rem add. visam Er/hoc non*
corr. ex non hoc P3/comprehendet (118): comprehendit Er 118 *rem ... visus: visus*
rem R 119 *non ... visus: visus non comprehendat R* 120 *medians: medium*
R/ipsam et: ipsum EP3R 121 *venienti: veniente ErR/corr. ex veniente P1*
 122 *non om. S* 123 *post completur add. nisi EP1 (scr. et del. E)*

eodem aere (et fuerit comprehensio non secundum reflexionem)
 125 nisi quando aer fuerit continuus inter rem visam et visum, et
 non abscederit lineas rectas verticales que sunt inter ea corpus
 densum, quoniam forma non extenditur in aere consimilis dia-
 fonitatis nisi secundum lineas rectas. Et propter hoc non com-
 prehendit visus rem visam que est cum eo in eodem aere et in
 130 parte opposita visui nisi quando aer medius inter eas fuerit
 diafonus consimilis diafonitatis.

[8.9] Quare vero visus non comprehendit rem visam nisi
 quando fuerit in ea densitas aut aliquid densitatis est propter
 duas causas, quarum altera est quia quod est densum est col-
 oratum, et ex colore venit forma ad visum ex qua comprehen-
 135 dit visus colorem rei vise. Quod autem est in fine diafonitatis
 caret colore, quare non comprehenditur a visu. Et causa se-
 cunda est quoniam visus non comprehendit rem visam nisi sit
 illuminata, et veniat ex luce que est in ea forma secunda ad vi-
 140 sum cum forma coloris. Et non erit forma secunda ex luce ori-
 enti super aliquod corpus nisi figatur lux in illo corpore super
 quod oritur. Cum ergo lux fuerit fixa in illo corpore, erit ex eo
 forma secunda; et quando lux orietur super corpus diafonum
 valde, non figetur in eo, sed extendetur in sua diafonitate.
 145 Cum ergo corpus diafonum fuerit oppositum visui et super ip-
 sum oritur lux ex parte in qua est visus, in eo extendetur et non
 figetur in sua superficie. Et sic non erit in superficie opposita
 visui illius corporis lux ex qua venit forma ad visum. Et si il-
 lud illuminatum cuius lux oritur super illud corpus diafonum
 150 fuerit oppositum visui, pertransibit lux eius in corpus diafo-
 num et perveniet ad visum, et nichil deferet cum eo ad visum
 ex colore corporis diafoni, quoniam corpus diafonum quod est

124 eodem *om.* P1/ante non *scr. et del.* fuerit comprehensio P1/non: nisi P3 (*scr. et del.*)/
 reflexionem: refractionem R 125 rem . . visum: visum et rem visam *Er/et visum*
om. EP3R 126 verticales *om.* R 128 nisi . . . diafonitatis (131) *om.* P1/non . . .
 visus (129): visus non comprehendit R 130 eas: ea R 131 diafonus: diafonis *Er*;
 diafonum S/diafonitatis *corr. ex* dyafoniatis P3 132 comprehendit: comprehendat
 R/visam *inter. a. m.* E 133 fuerit in ea: in ea fuerit R/aut *corr. ex* autem S/densitatis
corr. ex densitas S 134 est^{1.2} *om.* P1/est² *om.* S/est³ *om.* E/est coloratum (135) *transp.*
 P3/post coloratum (135) *add.* nisi (128) . . . coloratum (134/135) P1 (medius [130] *om.*/
 diafonus [131]: diafonum/est^{1.2} [134]: est in) 135 et *inter.* P1 137 compre-
 henditur: comprehendetur EP3R 139 luce: lumine EP3/secunda: prima P3
 140 cum: et P1/orienti (141): oriente R 142 cum *inter. a. m.* E/cum ergo *transp.*
 EP3R/post fuerit *scr. et del.* fi P3/illo *corr. ex* illa S/illo corpore *transp.* EP3R/erit *om.* S
 144 extendetur: extenditur *Er* 146 visus *corr. ex* lux P3/extendetur *corr. ex* exten-
 ditur S 148 illius: istius EP3R/post si *add.* fuerit EP3R 149 illuminatum:
 illuminatur *Er/ante* cuius *scr. et del.* lux P1/lux *om.* P3 150 fuerit *om.* R/fuerit . . .
 diafonum (151) *mg. a. m.* S/lux eius (?) S 151 cum eo: secum R 152 quod . . .
 diafonum (156) *mg. a. m.* S

in fine diafonitatis non habet colorem. Visus ergo comprehendet ex illo loco corpus illuminatum cuius lux oritur super corpus diafonum post corpus diafonum, et non comprehendet corpus diafonum propter hoc quia non comprehendit visum rem visam que est in fine diafonitatis. Et cum diafonitas corporis fuerit similis diafonitati aeris, erit eius dispositio sicut dispositio aeris, et non comprehendetur a visu, sicut nec aer et corpora diafona quorum diafonitas non est spissior diafonitate aeris non comprehendentur a visu, quoniam nulla forma venit ex eis ad visum que potest operari in visum. Et similiter erit si inter visum et rem visam fuerit medium corpus diafonum preter aerem et fuerit diafonitas rei vise non spissior diafonitate corporis medii.

[8.10] Et cum res visa fuerit densa, erit colorata, et cum super ipsam oritur lux, figetur in sua superficie, et erit ex colore eius et ex luce que oritur super ipsam forma que extenditur in aere et in corporibus diafonis. Et cum ista forma pervenerit ad visum, operabitur in eo, et ex ea sentiet visus rem visam. Et cum res visa fuerit diafona, sed minus quam aer, habebit colorem secundum suam spissitudinem, et cum super ipsam oritur lux, figetur in ea aliqua fixatione secundum illud quod est in ea de spissitudine, et pertransibit in ea secundum suam diafonitatem. Et erit ex ea forma in aere secundum colorem et lucem que sunt in sua superficie, et cum illa forma pervenerit ad visum, operabitur in visum, et sentiet visus illam rem visam. Et propter istam causam nichil comprehendit visus ex rebus visibilibus nisi quando fuerit densum aut fuerit in eo aliquid densitatis.

[8.11] Iam ergo declarate sunt cause propter quas nichil comprehendit visus nisi quando fuerint aggregate in eo intentiones predictae, et hoc quod declaravimus est illud quod intendimus declarare in isto tractatu.

153 non habet (?) S/comprehendet (154) *corr. ex comprehendit E* 154 loco (?) S
 156 quia: quod EP3 157 corporis (158): corpus Er 158 similis *corr. ex simul*
P1S/aeris corr. ex aerit S/erit eius dispositio: eius . . . erit P1 160 est spissior *corr. ex*
spissior est Er 161 quoniam *om. Er* 162 potest: possit EP3R 163 erit: accidit
R; om. EErP3 167 ipsam: ipsum S/lux . . . oritur (168) *mg. a. m. S/figetur: figura Er*
 168 eius (?) S/ipsam: ipsum P1S 170 *post ad add. ipsum EP3R/ea corr. ex eo E*
 172 spissitudinem *corr. ex dispositionem P1* 174 spissitudine *corr. ex spissitudi-*
nem S 175 *ante in scr. et del. e P3* 176 pervenerit: pervenit P3/*post ad scr. et del.*
istam causam et E 178 nichil: non R 179 *post quando add. ipsum visibile R/*
fuerit rep. Er 181 cause: res P3 182 nisi *om. S/in eo om. R/eo corr. ex eos P3*
 183 quod¹ *inter. S*

[SECUNDUS TRACTATUS]

[CAPITULUM 1]

[1.1] Declaratum est qualiter fiat visio, et est qualitas sensus visus a forma lucis et coloris que sunt in re visa ordinatorum ita sicut sunt in superficie rei vise. Visus autem comprehendit ex rebus visibilibus multas intentiones preter lucem et
5 colorem.

[1.2] Et etiam declaratum est in primo tractatu quod visio non erit nisi ex verticationibus linearum radialium, et linee radiales diversantur in dispositionibus suis, et similiter diversantur dispositiones formarum venientium super ipsas ad
10 visum.

[1.3] Et etiam comprehensio visus a re visa non est in omnibus temporibus et in omnibus visibilibus secundum unum modum. Sed diversatur qualitas sensus visus a rebus visibilibus, et diversatur qualitas sensus visus in una re visa secundum unum situm et secundum eandem distantiam.
15

[1.4] Et nos declarabimus in isto tractatu diversitatem dispositionum linearum radialium et distinguemus proprietates earum et omnes intentiones comprehensas a visu. Et declarabimus qualiter comprehendit visus quamlibet illarum et
20 diversitatem comprehensionis visus ab eis.

[CAPITULUM 2]

[2.1] Iam declaratum est in primo tractatu quod linee radiales ex quarum verticationibus comprehendit visus visibilia

1 sensus visus (2) *transp.* P3 2 a: et L3 3 ante ita *scr. et del.* et E/sunt *om.* P1
6 est *om.* P3/primo *corr. ex principio* S 7 erit: sit R; *corr. ex exit a. m.* E/post
verticationibus *scr. et del.* eorum P3 8 diversantur: diversentur R/dispositionibus
suis *transp.* EL3P3R 9 ante dispositiones *scr. et del.* in dispositionibus suis P1/ipsas
corr. ex istas a. m. E 12 temporibus: corporibus R; *inter.* L3/secundum: sed Er/
secundum . . . modum (13) *om.* R 14 in: ab C1EErL3P3/visa: visum P3 (*scr. et del.*)
15 unum situm *transp.* P3R 16 declarabimus . . . tractatu: dividemus istum
tractatum in tria capita in primo declarabimus R 18 et!: in secundo declarabimus
R/declarabimus (19) *om.* R 19 et: in tertio declarabimus R 20 post eis *scr. et del.*
visus ab eis E

- sunt linee recte quarum extremitates concurrunt apud centrum visus. Et iam declaratum est in forma visus quod membrum
 5 sentiens, quod est membrum glaciale, est compositum super extremitatem concavitatis nervi super quem compositus est oculus totus, et quod, quando iste nervus giratur, non giratur nisi a posteriori centri visus, et a posteriori totius oculi, et apud foramen quod est in concavo ossis.
- 10 [2.2] Et iam declaratum est quod linea recta transiens per omnia centra tunicarum visus extenditur in medio concavi nervi, et pervenit recte ad medium girationi concavi nervi, et transit per centrum foraminis quod est in anteriori uvee. Et iam declaratum est quod situs istius lineae non diversatur respectu totius visus, nec respectu tunicarum superficierum, nec respectu partium visus. Linea ergo recta transiens per omnia centra tunicarum visus semper extenditur recte ad locum girationis concavi nervi super quem componitur oculus in omnibus dispositionibus visus, sive sit visus in motu sive in quiete. Et
 20 quia ista linea transit per centrum visus et per centrum foraminis quod est in anteriori uvee, extenditur in medio pyramidis cuius conus est centrum visus, et continet ipsam circumferentia foraminis quod est in anteriori uvee; apellemus ergo istam lineam axem pyramidis.
- 25 [2.3] Et declaratum est etiam in ipso tractatu primo quod pyramis figurata inter rem visam et centrum visus distinguit ex superficie glacialis partem continentem totam formam rei vise que est apud basim illius pyramidis. Et erit forma ordinata in ista parte superficiei glacialis per verticationes linearum radialium extensarum inter rem visam et visum secundum ordinationem partium superficiei rei vise. Cum ergo visus comprehendit aliquam rem visam, et pervenit eius forma in parte superficiei glacialis quam distinguit pyramis predicta, quodlibet
 30

4 visus² corr. ex lucis P1 5 glaciale: glacialis R 6 quem: quam C1ErP1S
 7 oculus totus transp. C1Er/quod: quia P3/quando om. EP3R/post nervus scr. et del. gra
 P1/giratur om. C1ErP3R; inter. L3 8 ante centri add. nervo P3/post visus scr. et del.
 et a posteriori centri visus S 12 et¹ . . . nervi om. R/post nervi scr. et del. et pervenit
 recte ad medium S 13 centrum: medium EP3R/ante quod add. et L3 14 situs:
 centrum EP3R; corr. ex centrum L3 15 tunicarum superficierum transp. EP3R/ante
 nec² add. visus EP3R/nec²: in S/post nec² scr. et del. per P1 18 quem: quam ErP1S/
 corr. ex quam a. m. C1 19 visus¹ om. EL3P3R/ante sit scr. et del. ut L3 21 est om.
 EP3/post uveae add. et per centrum uveae R/pyramidis: pyramis L3S 22 conus . . .
 centrum: centrum est R/ante visus scr. et del. est S/post continet scr. et del. centrum P3/
 ipsam: ipsum EL3P3/circumferentia: circumferentiam Er 23 ante uvee scr. et del.
 ve P1 25 post et add. etiam L3/etiam om. L3/etiam . . . tractatu om. P1/ipso om. C1Er
 29 verticationes: verticationem EL3P3R 30 rem . . . visum: visum et rem visam P1
 31 rei vise corr. ex vise rei ErS/comprehendit (32): comprehenderit R 32 pervenit:
 pervenerit R/parte: partem R 33 quodlibet: quod licet Er

punctum forme predictae est super lineam radialem extensam
 35 inter illud punctum et punctum oppositum illi in superficie rei
 vise super quam venit forma ad illud punctum in superficie
 glacialis recte. Cum ergo forma rei vise fuerit in medio super-
 ficiei glacialis, erit axis predictus una linearum super quas veni-
 unt forme punctorum que sunt in superficie rei vise, et erit
 40 punctum superficiei rei vise quod est apud extremitatem istius
 axis illud super quod venit forma eius super istum axem.

[2.4] Et declaratum est in primo tractatu quod forme que
 comprehenduntur per visum extenduntur in corpore glacialis et
 in concavo nervi super quem componitur oculus, et perveniunt
 45 ad nervum communem qui est apud medium anterioris cerebri
 —et illic erit comprehensio sentientis ultimo a formis rerum vi-
 sibilium—et quod visio non completur nisi per adventum forme
 ad nervum communem, et quod extensio formarum a superficie
 glacialis intra corpus glacialis erit secundum rectitudinem line-
 50 arum rectarum radialium tantum, quoniam glacialis non recipit
 istas formas nisi secundum verticationes linearum radialium
 tantum.

[2.5] Et ultimum sentiens non comprehendit situs partium
 rei vise nisi secundum suum situm in superficie rei vise. Et
 55 cum situs partium forme adinvicem, scilicet forme pervenientis
 ad superficiem glacialis, sint situs partium superficiei rei vise
 adinvicem, et iste forme extenduntur sicut predictum est, et
 cum omnia ista ita sint, visio ergo non complebitur nisi post
 perventum forme que est in superficie glacialis ad nervum
 60 communem, et situs partium eius secundum suum esse in su-
 perficie glacialis sine aliqua admixtione.

[2.6] Forma autem non pervenit a superficie glacialis ad
 nervum communem nisi per extensionem eius in concavo nervi

34 forme predictae *transp.* P3/radialem *corr.* ex radialam P3 35 et . . . punctum (36)
mg. a. m. L3/punctum² *om.* P3/in *inter.* C1/in superficie: superficiei P1S 36 superficie:
 superficiem R 37 recte *inter.* a. m. E/ergo forma *transp.* P3 38 predictus: posi-
 tus P3 39 punctorum *corr.* ex predictorum L3 40 istius: illius S 41 quod *om.*
Er/forma *rep.* P3 44 nervi: termini P3/quem: quam L3S/perveniunt: perve-
 nit C1E²ErL3P3 45 post apud *scr.* et *del.* md P3/anterioris: interioris ErL3P1RS; *corr.*
ex interioris a. m. C1; *alter.* in interioris EP3 (a. m. E) 46 erit: est R/ante a *add.* et C1Er/
 a *corr.* ex autem L3 47 per adventum: perventum Er; *corr.* ex perventum a. m. C1
 48 quod *om.* P1 49 corpus *corr.* ex superficiem a. m. E/erit: est R 50 rectarum
om. C1Er/quoniam *inter.* L3 51 formas *inter.* a. m. S/verticationes: verticatio-
 nem EP3R 53 ante situs *add.* aliquam *mg.* P3/situs *om.* P3 54 superficie:
 superficiei S 55 adinvicem: inter se R 56 sint: sunt P1; sicut P3 57 adinvicem:
 inter se R/extenduntur: extendantur R/predictum: dictum P1 58 ita *om.* P3/sint:
 sunt C1Er/ergo: igitur Er/post *corr.* ex per C1 59 perventum: adventum EP3R
 60 post eius *add.* est C1/post esse *add.* est L3/superficie (61): superficiem R
 61 admixtione: mixtione C1Er 63 nervi *om.* L3

super quem componitur glacialis. Si ergo forma non perveniret
 65 in concavo istius nervi secundum suum esse in glaciali, nec eti-
 am perveniet ad nervum communem secundum suum esse.
 Forma autem non potest extendi a superficie glacialis ad conc-
 cavum nervi secundum rectitudinem linearum rectarum et con-
 servare situs partium secundum suum esse, quoniam omnes ille
 70 linee concurrunt apud centrum visus. Deinde quando fuerint
 extense secundum rectitudinem post centrum, convertetur situs
 earum, et quod est dextrum efficietur sinistrum et econverso, et
 superius inferius et inferius superius. Si ergo forma fuerit ex-
 tensa secundum rectitudinem linearum radialium, congregabi-
 75 tur apud centrum visus et efficietur quasi unum punctum; et
 quia centrum visus est in medio totius oculi et ante locum gira-
 tionis nervi concavi, si forma fuerit extensa a centro et ipsum
 unum punctum super unam lineam, perveniet ad locum giratio-
 nis et ipsum unum punctum. Et sic non perveniet forma tota
 80 ad locum girationis, quia non nisi unum punctum, scilicet quod
 est in extremitate axis pyramidis. Et si fuerit extensa secun-
 dum rectitudinem linearum radialium et pertransierit centrum,
 erit conversa secundum conversionem linearum se secantium
 super quas extendebatur. Non potest ergo forma pervenire a
 85 superficie glacialis ad concavum nervi ita quod situs partium
 sit secundum suum esse. Non potest ergo forma pervenire a
 superficie glacialis ad concavum nervi nisi secundum lineas
 reflexas secantes lineas radiales.

[2.7] Et cum ita est, visio ergo non complebitur nisi post-
 90 quam reflectitur forma que pervenit a superficie glacialis et
 extenditur super lineas secantes lineas radiales. Ista ergo re-
 flexio debet esse ante perventum ad centrum, quoniam si fue-

64 *post* componitur *add.* oculus vel *P1*; *add.* oculus sive humor *EP3R*/non *om.* *S*/
 perveniret: perveniet *L3*; perveniat *R* 65 concavo: concavum *R* 66 perveniet:
 perveniret *P1S*/nervum *corr.* ex formam *L3*/secundum *inter.* *L3* 68 rectitudinem:
 consuetudinem *Er* 69 suum esse *transp.* *EP3*/ille linee (70) *transp.* *P3* 70 deinde:
 et *R* 71 secundum *om.* *Er* 72 econverso: econtrario *R* 73 forma ... extensa
 (74): fuerit ... forma *P1* 76 *post* medio *scr.* et *del.* oculi *P1* 77 nervi concavi *transp.*
EL3P3R/extensa a centro *corr.* ex a centro extensa *P3*/*post* centro *add.* oculi *EP3R*/et:
 vel *EP3*; *corr.* ex vel *L3*/ipsum: ipsa *P1*; ipsius *R*; *corr.* ex ipsa *S*; *alter.* in ipsa *L3*
 78 unam lineam *transp.* *S* 79 et¹ *inter.* *L3*/ipsum: ipsa *P1S*; ipsius *R*; *alter.* in ipsa *L3*/
 unum *corr.* ex unam *S*/tota ... pyramidis (81) *mg.* a. m. *L3S*/*post* tota *add.* scilicet *C1Er*
 80 ad ... girationis *om.* *L3*/*post* non *scr.* et *del.* est *E* 82 pertransierit: pertransiverit
C1Er; pertransiret *L3* 83 *post* secundum *scr.* et *del.* consequod *P3*/conversionem:
 consequens in termino *EP3*; *corr.* ex conversiconem *L3*/ante se *scr.* et *del.* radialium *P1*/
post se *add.* se *inter.* *L3*/*post* secantium *scr.* et *del.* superius *P1* 85 ita ... nervi (87) *mg.*
 a. m. *E*; *om.* *S*/quod: ut *R* 87 *post* nervi *scr.* et *del.* r *P3* 88 reflexas: refractas *R*
 89 est: sit *R* 90 reflectitur: refracta fuerit *R* 91 *post* lineas¹ *add.* rectas *L3*/lineas²
om. *P1*/ergo *om.* *P1*/reflexio (92): refractio *R*

rint reflexe post transitum centri, erunt converse.

[2.8] Et iam declaratum est quod ista forma pertransit in
 95 corpore glacialis secundum rectitudinem linearum radialium, et
 cum non potest pervenire ad concavum nervi nisi postquam
 reflectitur super lineas secantes lineas radiales, forma non re-
 flectitur nisi post pertransitum eius in corpore glacialis. Et iam
 predictum est in forma visus quod corpus glacialis est diverse
 100 diafonitatis et quod pars posterior eius, que dicitur vitreum,
 est diverse diafonitatis a parte anteriori. Et nullum corpus est
 in glaciali diverse forme a forma corporis anterioris preter cor-
 pus vitreum. Et ex proprietate formarum lucis et coloris est ut
 reflectantur quando concurrerint alii corpori diverse diafonita-
 105 tis a corpore primo. Forme ergo non reflectuntur nisi apud
 perventum earum ad humorem vitreum, et istud corpus non
 fuit diverse diafonitatis a corpore anterioris glacialis nisi ut
 reflectantur forme in ipso.

[2.9] Et debet esse superficies istius corporis antecedens
 110 centrum ut reflectantur forme apud ipsum antequam pertran-
 seant centrum. Et debet ista superficies esse consimilis ordi-
 nationis, quoniam si non fuerit consimilis ordinationis, appar-
 ebit forma monstruosa post reflexionem. Superficies autem
 consimilis ordinationis aut est plana aut est sperica. Et non
 115 potest esse superficies ista ex spera cuius centrum erit centrum
 visus, quoniam si ita esset, essent lineae radiales semper per-
 pendiculares super ipsam, et sic extenderetur forma secundum
 rectitudinem earum, et non reflecteretur. Nec potest esse ex

93 reflexe: refractae R 94 ista: nulla P3; alter. in nulla a. m. E/pertransit: pertran-
 seat R 96 potest: possit R 97 reflectitur: refracta fuerit R/post lineas¹ add.
 radiales C1Er; scr. et del. radiales E/secantes lineas om. P1/secantes . . . radiales inter.
 L3/post forma add. ergo P1R/reflectitur (98): refringitur R 98 post om. EP3R/
 pertransitum: transitum L3P1S; per transitum R/glacialis: glaciali C1Er 100 eius
 om. S/que: quod P3/vitreum: humor vitreus R 101 diverse . . . glaciali (102) mg. a.
 m. S/anteriori: anteriore R 102 preter: inter ipsum et P1S 104 reflectantur:
 refringantur R/post quando add. concurrunt P3/concurrerint: occurrerint R/diverse
 om. P3 105 ergo non om. C1Er/reflectuntur: reflectantur Er; refringuntur R/apud:
 ad primum C1Er 107 anterioris: anteriori L3/anterioris glacialis transp. P3/ut
 reflectantur (108): refringerentur R 108 in inter. L3 109 esse om. R/istius corr.
 ex ipsius S/antecedens: antecedere R 110 reflectantur: refringantur R 111 post
 debet scr. et del. esse P1 112 quoniam . . . ordinationis om. P3/non inter. L3/
 ordinationis corr. ex coordinationis C1 113 post reflexionem: propter refractionem R/
 autem: ante S 114 est² om. EP3 115 esse . . . ista: ista . . . esse EP3R/superficies
 ista transp. C1Er/post ista scr. et del. et Er/ex spera corr. ex spera ex Er/erit: est EP3R
 116 post radiales add. lineae P3 (alter. ex linea)/semper: super P3; inter. a. m. C1; om. Er
 117 ipsam corr. ex ipsum a. m. C1/extenderetur: extendetur C1ErL3/forma om. EP3
 118 ante earum scr. et del. a Er/reflecteretur: reflectetur C1ErL3; reflectuntur E;
 refringeretur R

spera parva, quoniam si fuerit ex spera parva, quando forma
 120 reflectetur ab ea et elongabitur ab ea, fiet monstruosa. Ista
 ergo superficies aut est plana aut est sperica spere alicuius et
 aliquante bone quantitatis ita quod spericitas eius non opera-
 bitur in ordinatione forme.

[2.10] Superfices ergo humoris glacialis que est differentia
 125 communis inter istud corpus et corpus antierius glacialis est
 superficies consimilis ordinationis antecedens centrum visus.
 Et omnes forme pervenientes in superficiem glacialis extendun-
 tur in corpore glacialis secundum rectitudinem linearum radial-
 ium quousque perveniunt ad istam superficiem, et cum per-
 130 venerint ad istam superficiem, reflectuntur apud ipsam secun-
 dum lineas consimilis ordinationis secantes lineas radiales.
 Linee ergo radiales non iuvant ad ordinationem formarum
 rerum visibilium nisi apud glaciale tantum, quoniam apud
 membrum istud erit principium sensus. Et declaratum est eti-
 135 am in primo tractatu quod impossibile est ut forma rei vise sit
 ordinata in superficie visus cum magnitudine rei vise et parvi-
 tate rei sentientis nisi per istas lineas. Iste ergo linee non sunt
 nisi instrumentum visui per quas completur comprehensio re-
 rum visarum secundum suum esse. Perventus autem formarum
 140 ad ultimum sentiens non indiget extensione secundum rectitu-
 dinem istarum formarum.

[2.11] Et receptio membri sentientis ad formas non est si-
 cut receptio corporum diafonorum ad istas formas. Quoniam
 membrum sentiens recipit istas formas, et sentit eas, et per-

119 spera¹: sperica EL3P3/spera parva¹ trans. P3/quoniam . . . parva inter. L3/ex
 om. P1 120 reflectetur: refringetur R/ea²: eo P1S/fiet: fiet P1S/monstruosa corr. ex
 monstroso P3 121 est² om. EP3R/est sperica transp. C1/post sperica add. ex R/et
 aliquante (122) om. R 122 spericitas: speritas Er; corr. ex speritas a. m. C1/operabitur
 (123): operatur L3 123 post in scr. et del. operatione C1/ordinatione: ordinationem
 L3P1S/ordinatione forme transp. C1 124 est differentia transp. P1 125 corpus
 et om. P1/post corpus¹ add. vitrei R/anterius om. P1S 127 superficiem: super-
 ficie EL3P3 128 glacialis om. Er 129 perveniunt: perveniant R/pervenerint
 (130): perveniunt EL3P3 130 ante ad scr. et del. ad istam S/istam superficiem
 transp. EP3R 132 ergo radiales transp. Er/ordinationem: ordinem L3 134 mem-
 brum istud transp. C1Er/erit: est EL3P3R/erit principium transp. R/etiam (135)
 om. C1EErP3R 135 post tractatu add. etiam EP3R/ut inter. P3 136 magnitudine:
 ymagine EP1P3R; alter. in ymagine L3; corr. ex ymagine S 138 completur com-
 prehensio transp. P3/comprehensio: visio P1S 139 post secundum scr. et del. visum
 Er/suum esse corr. ex esse suum Er 140 extensione: intentione S 141 forma-
 rum: linearum R 142 post et add. etiam C1ErL3; add. est P1S/post receptio add.
 formarum in R/membri sentientis: membro sentiente R/ad formas om. R/est om. P1S/
 post est add. nisi EP3 (scr. et del. E) 143 corporum . . . formas: formarum in corpori-
 bus diaphanis R 144 membrum: membrorum Er/post sentiens scr. et del. non L3/
 pertranseunt (145): per transeunt Er/post per et ante transeunt (145) scr. et del. corpora
 autem diafona non recipiunt istas formas nisi receptione qua recipiunt ad redendum et
 non sentiunt ipsas Er

145 transeunt in eo propter suam diafonitatem, et virtutem sensi-
bilem que est in eo recipit ergo istas formas secundum recep-
tionem sensus. Corpora autem diafona non recipiunt istas
formas nisi receptione qua recipiunt ad redendum, et non
sentiunt ipsas. Et cum receptio corporis sentientis ab istis
150 formis non est sicut receptio corporum diafonorum non sen-
tientium, extensio formarum in corpore sentienti non debet
esse secundum verticationes quas corpora diafona exigunt.
Visus ergo non est appropriatus receptioni formarum ex verti-
cationibus linearum radialium tantum nisi quia proprietas for-
155 marum est ut extendantur in corporibus diafonis super omnes
verticationes rectas. Et cum iste forme pervenerint apud mem-
brum sentiens ordinate et comprehendantur a membro sentien-
te ordinate, nichil remanebit post indigens istarum verticatio-
nibus.

160 [2.12] Pars ergo anterioris tantum glacialis est appropriata
receptioni formarum ex verticationibus linearum radialium;
posterior autem pars, que est vitreum, et virtus recipiens que
est in isto corpore non est appropriata cum sensu suo istarum
formarum nisi ad custodiendum ordinationem earum tantum.
165 Et cum ita est, qualitas ergo receptionis vitrei a formis non est
sicut qualitas receptionis corporis anterioris glacialis, et virtus
recipiens que est in vitreo non est virtus recipiens que est in
parte anteriori.

[2.13] Et cum qualitas receptionis vitrei a formis non est
170 qualitas receptionis partis anterioris glacialis, reflexio ergo
formarum apud superficiem vitrei non est nisi propter diver-
sitem qualitatis receptionis sensus inter ista duo corpora.
Forme ergo reflectuntur apud vitreum duabus de causis qua-
rum altera est diversitas diafonitatis duorum corporum, et
175 altera est diversitas qualitatis receptionis sensus inter ista duo

145 eo: ea P1S 146 istas formas *transp.* P1 147 *post sensus add.* et L3/istas
formas (148) *transp.* P1 148 qua: quia P1 149 istis: istas Er 150 sentientium
(151): sentium L3 151 formarum *om.* P3/sentienti: sentiente R 153 *post visus*
add. est P3/receptioni *corr.* ex recte P3 154 radialium *corr.* ex radealium Er/
proprietas: proprietates S 156 rectas *corr.* ex recta P3/cum *inter.* S/apud: ad R/
membrum (157) *corr.* ex membro Er 160 ergo *om.* EP3/anterioris: anterior R/
appropriata *corr.* ex propria S 161 verticationibus: virtutibus EP3 162 vit-
reum: humor vitreus R 163 isto: illo EP3/sensu suo *transp.* R 164 ordinationem
earum *transp.* C1EErP3R/earum: eorum R; *alter.* in eorum E 166 *post sicut add.*
receptio corporis sive EP3R (sive: vel P3)/receptionis *om.* R 167 in: cum EErP3/in
... est *inter.* a. m. L3 (in: cum)/virtus *om.* S 168 anteriori *om.* E; *mg.* ErP3 (a. m. Er)
169 receptionis *corr.* ex recipiens P1/est: sit R 170 receptionis *om.* R/reflexio:
refractio R 171 nisi *om.* P1 173 reflectuntur: reflectantur C1L3; refringuntur R
175 est *om.* EL3P3R/*post sensus scr. et del.* sensus L3

corpora.

[2.14] Et si diafonitas duorum corporum esset consimilis, esset forma extensa in corpore vitreo secundum rectitudinem linearum radialium propter consimilitudinem diafonitatis, et
 180 esset reflexa propter diversitatem qualitatis sensus. Et sic esset forma post reflexionem monstruosa, aut due forme essent propter istam dispositionem. Et cum diversitas diafonitatis affirmat reflexionem, scilicet obliquationem, et diversitas qualitatis sensus affirmat illam obliquationem, erit forma post
 185 obliquationem una forma, et propter hoc diversatur diafonitas corporis vitrei et diafonitas corporis anterioris glacialis. Forme ergo perveniunt ad vitreum ordinate secundum ordinationem earum in superficie visi, et recipit ipsas istud corpus, et sentit ipsas. Deinde obliquantur propter diversitatem diafonitatis et
 190 diversitatem sensus istius corporis, et sic pervenit forma secundum dispositionem suam. Deinde extendetur iste sensus, et iste forme, per hoc corpus quousque perveniat iste sensus et iste forme ad ultimum sentiens. Et erit extensio sensus et extensio forme in corpore vitrei et in corpore sentienti extenso in
 195 concavo nervi ad ultimum sentiens sicut extensio sensus tactus et sensus doloris ad ultimum sentiens.

[2.15] Sensus autem tactus et sensus doloris non extenduntur a membris nisi in filis nervorum et in spiritu extenso secundum illa fila. Et forme rerum visibilium quando pervenerint
 200 in corpus humoris vitrei, extendetur sensus ab isto membro in corpus sentiens extensum in concavo nervi continuati inter visum et antierius cerebri. Et secundum extensionem sensus extenduntur forme ordinate secundum suam dispositionem, quoniam corpus sentiens naturaliter conservat ordinationem
 205 istarum formarum. Et ista ordinatio conservatur in corpore sentienti, quoniam ordinatio partium corporis sentientis recipi-

177 *post si add. ista P1S/post diafonitas add. istorum EP3; add. ista R* 179 radialium
corr. ex radialia P3 180 *reflexa: refracta R* 181 *post reflexionem: propter*
refractionem R/post reflexionem add. aut C1Er/aut: aud S 183 *affirmat reflexionem:*
affirmet refractionem R/reflexionem: reflexio Er; corr. ex reflexio a. m. C1/scilicet
obliquationem om. R/obliquationem: obliquo Er; obliquatione P3; corr. ex obliquo
a. m. C1 184 *affirmat: affirmet R/ante illam scr. et del. reflexionem S/illam om. P1/*
post illam add. refractionem aut R 186 *diafonitas corr. ex diafonitatis L3/corporis²*
om. P1S 188 *visi: nisi Er/istud: illud P1S/post et² add. ordinat ipsas vel EP3*
 189 *obliquantur: obliquatur EP3; refringitur forma R* 191 *extendetur: extenditur*
R/iste inter. a. m. L3 194 *vitrei: vitreo R; corr. ex utrei Er/sentienti: sentiente R; corr.*
ex sentiententi S/extenso: extensio P1 196 *ante et scr. et del. u C1* 197 *post autem*
scr. et del. aut Er 199 *illa: ista P1RS/forme: corpora P3/pervenerint: perveni-*
unt EL3P3 200 *isto: illo EP3R* 201 *continuati corr. ex coniuncti L3*
 204 *conservat: servat EP3R* 205 *et . . . formarum (207) mg. a. m. C1; om. Er/*
conservatur . . . ordinatio (206) inter. a. m. S 206 *sentienti: sentiente C1R*

entium partes formarum, et ordinatio virtutis recipientis que
 est in partibus corporis recipientis, est in corpore vitrei et in
 omni corpore subtili extenso in concavo nervi ordinatio con-
 210 similis. Et cum ita est, quando forma pervenit ad quodlibet
 punctum superficiei vitrei, curret in verticatione continua, et
 non alterabitur eius situs in concavitate nervi in quo extenditur
 corpus sentiens. Et erunt omnes verticationes per quas currunt
 omnia puncta que sunt in forma consimilis ordinationis adin-
 215 vicem, et erunt omnes iste verticationes girantes apud giratio-
 nem nervi, et erunt apud girationem ordinate secundum suam
 ordinationem ante girationem, et post, propter qualitatem sensus
 istius corporis. Et sic perveniet forma ad nervum commu-
 nem secundum suam dispositionem, et non est possibile ut sit
 220 extensio formarum visibilium usque ad ultimum sentiens nisi
 secundum hunc modum, quoniam non est possibile ut forme
 perveniant ad nervum communem secundum suum esse nisi sit
 extensio earum secundum hunc modum.

[2.16] Et cum forme extenduntur secundum istam ordinati-
 225 onem, oportet ut forma perveniens in quolibet puncto super-
 ficiei glacialis semper extendatur super eandem verticationem
 ad idem punctum loci nervi communis ad quod pervenit for-
 ma. Sed tamen forma perveniens ad quodlibet punctum su-
 perficiei glacialis pervenit semper ad idem punctum superficiei
 230 vitrei. Et sequitur ex hoc ut omnia duo puncta consimilis situs
 in respectu duorum oculorum ab eis extendantur due forme ad
 idem punctum in nervo communi.

[2.17] Et etiam sequitur ut sit corpus sentiens quod est in
 concavo nervi aliquantulum diafonum ut appareant in eo for-
 235 me lucis et coloris, et sequitur etiam ut sit eius diafonitas simi-
 lis diafonitati humoris vitrei ut non obliquantur forme apud

207 que . . . recipientis (208) *om.* P1 209 omni *om.* P3 210 est: sit R
 211 continua: continuarum P3 212 in²: ex P3 213 *post omnes add.* iste C1Er/
ante per add. iste EL3P3R/per . . . verticationes (215) *mg. a. m.* E/currunt *corr.* ex
 concurrunt S 214 adinvicem (215): inter se R 215 iste *om.* P15 216 *post*
erunt add. omnes P1S 217 ordinationem *corr.* ex reflexionem P1/propter *mg.* L3
 218 perveniet: pervenit P1 219 sit: si Er; *corr.* ex si a. m. C1 220 nisi *inter.* L3
 224 istam: suam P3 225 in . . . puncto: ad quodlibet punctum EL3P3
 226 semper: super P3/extendatur *corr.* ex extenditur P1 227 idem *corr.* ex ean-
 dem P3 228 tamen *alter.* ex inde in quoniam *deinde corr.* ex quoniam a. m. C1/
 perveniens: proveniens P1; *alter.* in proveniens S/punctum *om.* P3 229 punctum:
 puncti S 230 sequitur: sequetur L3/omnia duo puncta: ex omnibus duobus punctis
 R 231 ab eis *om.* R 232 sequitur: sequetur L3/ante ut *add.* ex hoc EP3R/sit
om. EL3P3R 234 *post* nervi *add.* sit R 235 sequitur: sequetur L3/sequitur etiam
transp. EP3R (*post etiam scr. et del.* ut P3)/ *post* ut *scr. et del.* sit P3/eius diafonitas *transp.*
 C1ErP3/similis (236) *corr.* ex simul P1 236 vitrei *om.* P1/obliquantur: obliquentur
 P3; refringantur R

perventum earum ad ultimam superficiem vitrei vicinam
 concavo nervi, quoniam quando diafonitas duorum corporum
 fuerit consimilis, non obliquabuntur forme. Et non est possi-
 240 bile ut forme obliquantur apud istam superficiem, quoniam
 ista superficies est sperica, et est ex spera. Si autem forme
 obliquarentur ab ista superficie, non elongarentur ab ea nisi
 modicum, et fierent statim monstruose. Obliquatio ergo for-
 marum non potest esse apud istam superficiem.

245 [2.18] Et cum diafonitas corporis sentientis quod est in
 concavo nervi non est diversa a diafonitate humoris vitrei, nec
 faciet contingere ista diversitas aliquam diversitatem in forma.
 Et quamvis forma extendatur cum extensione sensus, diafoni-
 tas corporis sentientis quod est in concavo nervi non est diver-
 250 sa a diafonitate corporis vitrei. Diafonitas autem ista istius
 corporis non est nisi ut extendantur forme in eo secundum ver-
 ticationes quas exigit diafonitas. Et diafonitas eius non est
 nisi ut recipiat formas lucis et coloris et ut appareant in eo
 forme, quoniam corpus non recipit lucem et colorem, nec per-
 255 transeunt in eo forme lucis et coloris nisi sit diafonum aut fue-
 rit in eo aliquid diafonitatis. Et non apparet lux et color in
 corpore diafono nisi sit cum eo in diafonitate aliquid spissitu-
 dinis, et propter hoc non est glacialis in fine diafonitatis nec in
 fine spissitudinis. Corpus ergo sentiens quod est in concavo
 260 nervi est diafonum, et in eo est cum hoc aliquid spissitudinis.
 Forma autem pertransit in isto corpore cum eo quod est in eo
 de diafonitate, et apparent forme in eo virtuti sensitive cum eo
 quod est in eo de spissitudine. Et sentiens ultimum non com-
 prehendit formas lucis et coloris nisi ex formis pervenientibus
 265 ad istud corpus apud perventum eorum ad nervum commu-
 nem, et comprehendit lucem ex illuminatione istius corporis et

237 earum om. P1 238 concavo inter. L3 239 ante fuerit inter. non P3/non¹ om.
 P3/obliquabuntur: refringentur R 240 forme obliquantur transp. C1Er/obliquantur:
 obliquantur C1P3; refringantur R/istam corr. ex formam P3 241 est¹ om. L3/sperica
 et inter. L3/et . . . spera om. R/ex om. P3 242 obliquarentur: obliquantur P1;
 refringerentur R 243 obliquatio: refractio R/ergo formarum (244) transp. P3
 244 post esse scr. et del. apud S 246 est: sit R/nec: non C1ErR 249 ante corporis
 add. tamen R 251 nisi om. C1Er/ut om. S 252 exigit: exigit R/ante et add. eius
 P1S/diafonitas² . . . nisi (253) om. R 253 post ut¹ scr. et del. extendantur S/recipiat:
 rericipiat Er; corr. ex recipia S/post et² scr. et del. 1 L3/appareant: apparent L3
 254 forme om. C1EErL3P3R/non recipit corr. ex recipit non P3 255 post coloris add.
 nec pertranseunt P1 256 ante in¹ scr. et del. diaffo Er 257 cum: in C1EErL3P3R/
 eo in: eius R 259 concavo: concavitate P1 260 est² inter. L3/est cum hoc: cum
 hoc est L3/cum hoc: insuper R 261 isto om. Er 262 de: ex C1Er/forme in eo:
 in eo forme L3R/in eo inter. L3/eo: ea EP3/virtuti: virtutis L3/sensitive corr. ex senti P3
 263 est om. EP3/de inter. L3 264 pervenientibus: venientibus P1S 265 eorum:
 earum R

colorem ex coloratione. Secundum ergo hunc modum erit per-
ventus formarum ad ultimum sentiens et comprehensio ultimi
sentientis quoad illas.

270 [2.19] Et postquam declaratum est quod forme obliquantur
apud superficiem vitrei, dicamus quod axis pyramidis radialis
non potest esse declinans super istam superficiem, nec potest
esse alia linea perpendicularis super ipsam. Quoniam axis si
fuerit declinans super istam superficiem, quando forme per-
275 venirent ad istam superficiem, diversificarentur in ordinatione
et mutarentur sue dispositiones. Forme autem non possunt
pervenire in superficie vitrei secundum suum esse nisi fuerit
axis pyramidis super istam superficiem perpendicularis. Quo-
niam quando visus fuerit oppositus alicui rei vise et pervenerit
280 axis radialis super superficiem illius rei vise, perveniet forma
illius rei vise in superficie glacialis ordinata secundum ordina-
tionem partium superficiei rei vise, et perveniet forma puncti
quod est apud extremitatem axis superficiei rei vise ad punc-
tum quod est super axem in superficie glacialis. Et pervenient
285 forme omnium punctorum superficiei rei vise quorum remotio a
puncto quod est apud extremitatem axis est equalis ad puncta
formarum que sunt in superficie glacialis quorum remotio a
puncto quod est super axem est equalis, quoniam omnia punc-
ta pervenientia ad superficiem glacialis sunt super lineas radi-
290 ales extensas a centro visus ad superficiem visus, et axis radi-
alis est perpendicularis super superficiem glacialis. Omnes er-
go superficies plane exeuntes ab axe et secantes superficiem
glacialis erunt perpendiculares super istam superficiem.

[2.20] Et iam declaratum est quod superficies humoris vit-
295 rei aut est plana aut est sperica, et centrum eius non est cen-
trum visus. Si ergo axis radialis est declinans super istam su-
perficiem et non est perpendicularis super ipsam, non exibat ab
axe superficies plana perpendicularis super istam superficiem

267 colorem *corr. ex corpore Er*/perventus (268); proventus C1Er 268 ultimi:
illius L3 270 et *om. P3*/obliquantur: obliquantur P3; refringantur R 271 pyra-
midis: pyramis P1 272 esse *rep. P1/ante nec add. vitrei S; add. vitrei sed P1/post nec*
add. etiam P1S (inter. S)/post potest² add. non P1S 273 alia linea *om. P1S*
275 diversificarentur *corr. ex diversicarentur S/in . . . mutarentur (276) inter. a. m. S*
276 sue: ipsarum R 277 superficie: superficiem C1EErP3R 278 pyramidis *corr.*
ex pyramis P1/superficiem: pyramidem EP3; corr. ex pyramidem a. m. L3 279 fuerit:
fuit L3/et . . . vise (281) *mg. a. m. S*/pervenerit: pervenit EP3 280 post super *add.*
istam EP3R/illius: istius P3R/illius rei transp. L3/illius rei vise: rei vise istius E
281 superficie: superficiem L3R 282 perveniet: pervenit Er 283 ad: apud EP3
284 super *om. Er*/pervenient: perveniet Er 288 est¹ *om. EP3/est equalis*
transp. EP3R 290 ad . . . visus *om. Er* 293 super *rep. P3* 295 eius *corr. ex*
visus Er 297 et *inter. L3/ipsam: istam S* 298 post axe *inter. super P3/plana:*
planas P3/istam corr. ex ipsam P1

nisi una superficies tantum, et omnes superficies residue exe-
 300 untes ab axe erunt declinantes super ipsam, quoniam hec est
 proprietas linearum declinantium super superficies planas et
 spericas. Ymaginemur ergo superficiem exeuntem ab axe et
 perpendicularem super superficiem vitrei extendi ab axe. Se-
 cabit ergo superficiem vitrei et superficiem glacialis, et signabit
 5 in eis duas differentias communes. Et ymaginemur super dif-
 ferentiam communem que est communis huic superficiei et su-
 perficiei glacialis inter istam superficiem et superficiem glaci-
 alis duo puncta, et sint remota a puncto quod est super axem
 equaliter. Et ymaginemur duas lineas exeuntes a centro glaci-
 10 alis usque ad ista duo puncta. Erunt ergo due linee cum axe in
 superficie communi perpendiculari super superficiem vitrei,
 quoniam duo puncta et punctum centri ista tria sunt in ista
 superficie. Et erunt duo anguli qui fient ex istis duabus lineis
 et axe equales, et erunt iste due linee secantes differentiam
 15 communem que est in superficie vitrei super puncta duo. Et
 similiter axis secabit communem differentiam istam et super
 punctum medium inter illa duo puncta. Si ergo superficies
 vitrei est plana, erit differentia communis linea recta. Et si
 axis fuerit declinans super superficiem vitrei, et fuerit super-
 20 ficies que fecit differentiam communem perpendicularis super
 istam superficiem, erit axis declinans super communem differ-
 entiam, scilicet super istam lineam. Et erunt laterum duo an-
 guli inequales, quoniam si axis esset perpendicularis super
 istam differentiam communem, esset perpendicularis super

300 ipsam: ipsum Er 1 super om. Er; inter. a. m. S 2 ymaginemur: imaginemus
 Er/ergo: igitur R/post superficiem add. ABCD R/post axe add. AC R 3 ante super
 scr. et del. exeuntem P1/super inter. L3/post vitrei add. FGE R/ab axe om. R 4 post
 ergo scr. et del. ab axe P3/superficiem corr. ex superficies a. m. C1 5 in eis corr. ex in
 ipsas P1/post communes add. in glaciali quidem BD in vitreo vero EF R 6 superficiei
 et (7) om. P1 7 inter . . . glacialis (8) om. R/post inter scr. et del. ppa Er 8 post
 puncta add. BD R/sint: sunt C1Er/post puncto add. AR 9 equaliter corr. ex equalem
 P3/glacialis (10) om. C1Er 10 ante usque add. quod est C R/ista duo puncta: duo
 . . . ista L3/post puncta add. BD R/post ergo add. iste C1Er; add. hae R/post axe add. AC R
 11 post communi add. ABCD R/post vitrei add. EGF R 12 post puncta add. BD R/post
 centri add. C R/ista tria om. R/sunt: sint EP3/ista superficie (13) transp. C1ErP1
 13 istis duabus transp. L3 14 post et¹ add. ex P1S/post axe add. scilicet anguli ACB
 ACD R/erunt: sint R/post linee add. CB CD R 15 puncta duo transp. C1Er; duobus
 punctis E F R 16 secabit: secet R/communem differentiam transp. L3/communem
 . . . istam: differentiam . . . communem EP3R/post istam add. differentiam C1Er/et om.
 R; scilicet C1EErL3P3 17 post punctum add. G R/medium: interiectum R/post
 puncta add. E F R 18 est plana om. P1 19 post axis add. AC R 21 post erit
 add. etiam R/post axis add. AC R/communem differentiam (22) transp. P1 22 scili-
 cet om. P1R; inter. a. m. S/istam om. R/post lineam add. EF R/et erunt: eruntque R/
 laterum: latera EP3; om. R 23 ante inequales add. EGC FGC R/post axis add. AC R
 24 istam om. R/post communem add. EF R; scr. et del. esset perpendicularis super istam
 differentiam communem S/esset inter. L3

- 25 superficiem. Et cum duo predicti anguli sint inequales, et duo anguli qui sunt apud centrum glacialis quod est extremitas axis sunt equales, erunt due partes lineae quae est differentia communis inequales. Ergo erunt duo puncta extremitatum diverse distantiae a puncto quod est super axem existenti in ista linea.
- 30 Et ista duo puncta sunt illa ad quae perveniunt formae duorum punctorum superficiei glacialis quae sunt equaliter distantiae ab axe, quoniam sunt apud duas extremitates duarum linearum radialium transeuntium per ista duo puncta. Et punctus qui est super axem ex superficie vitrei est ille ad quem pervenit
- 35 forma puncti quod est super axem ex superficie glacialis. Et cum axis fuerit declinans super superficiem vitrei, et superficies vitrei fuerit plana, duo puncta formae pervenientis in superficie glacialis quorum distantia a puncto quod est super axem est equalis quae sunt in superficie perpendiculari super superficiem vitrei, quando pervenerint ad superficiem vitrei, erit distantia eorum a puncto pervenienti super axem distantia inequalis.

- [2.21] Et quando axis fuerit declinans super superficiem vitrei, et fuerit superficies vitrei plana, erit differentia communis quae sit a qualibet superficie exeunti ab axe et secante superficiem vitrei continens cum axe duos angulos inequales, praeter unam superficiem tantum, et est illa quae secat superficiem perpendicularem super vitreum, quoniam differentia communis eius continebit cum axe duos angulos rectos. Et erit

25 ante et¹ add. vitrei EP1P3; add. vitrei et duo anguli EGC FGE aequales R/et¹: sed R/post cum add. hi R/predicti anguli transp. EP3/sint: sunt Er 26 post anguli add. EGC FCG R/post glacialis add. C R/post axis add. AC R 27 sunt: sint EP3R/post erunt add. EG et GF R/post due scr. et del. equales P3/post lineae add. EF R 28 ante ergo add. quia enim trianguli CEF latera CE, CF sunt inaequalia (secus axis AC essent perpendicularis ad FE per 4 p. 10 d I, contra hypothesim) esto maius CE: factoque ipsi CE aequali CH, ducatur GH recta, quae per constructionem & 4 p I erit aequalis ipsi GE: ductaque ex G perpendiculari GI super HC: erit per 16 p I angulus GFE obtusus: itaque per 19 p I latus HG, idem est EG, erit maius latere FG R/ergo om. P3/ergo erunt transp. Er/post puncta add. EF R/ante diverse add. ipsius R 29 distantiae corr. ex substantie C1/post puncto add. G R/quod est: existente/existenti om. R; exeunti EP3/existenti in: existentum Er/ista: illa EP3R/linea om. L3 30 post illa scr. et del. quae adveniunt S 32 post axe add. AC R 33 transeuntium corr. ex transeuntum S/punctus: punctum C1R/ante qui add. G R/qui: quod C1Er 34 super: supra C1Er/post axem add. AC R/illem: illa P3; illud R/quem: quod R 35 post puncti add. A R 36 post axis add. AC R 37 post plana add. tunc quando R/post puncta add. quorum R/pervenientis; perveniunt R 38 post glacialis add. et R/post puncto add. A R 39 est om. Er/post equalis add. et R/perpendiculari: perpendicularis P3 40 quando om. R/distantia (41): differentia EP3 41 pervenienti: G veniente R/post distantia add. eorum a puncto L3 44 erit: tunc R 45 sit: fit EP1P3R/a qualibet: equalibus Er/exeunti: exeunte R 46 continens: contingens P1; continebit R/inequales om. EP3 47 unam inter. L3/unam superficiem transp. L3

- 50 axis declinans super differentias communes omnium superfici-
erum residuarum. Et cum duo anguli predicti fuerint inequales,
et fuerint duo anguli respicientes duas partes differentie com-
munis, scilicet anguli qui sunt apud centrum superficiei glaci-
alis, equales, erunt due partes differentie communis que est in
55 superficie vitrei inequales, et erunt duo puncta que sunt extre-
mitates istius differentie communis diverse distantie a puncto
quod est super axem. Due autem partes differentie communis
que sunt in superficie glacialis erunt equales, et erunt duo
puncta que sunt in extremitate istius differentie communis
60 equalis distantie a puncto qui est super axem in superficie
glacialis. Et cum ita est, quando forma pervenerit a superficie
glacialis ad superficiem vitrei, erit ordinatio eius non secun-
dum suum esse in superficie glacialis nec secundum suum esse
in superficie rei vise.
- 65 [2.22] Et similiter etiam declarabitur quando superficies
vitrea fuerit sperica, et fuerit axis declinans super ipsam, quo-
niam puncta que sunt in superficie glacialis quorum distantia
ab axe est equalis quando pervenerint ad superficiem vitrei,
erit distantia eorum a puncto axis inequalis. Quoniam quando
70 axis non fuerit perpendicularis super superficiem vitrei, et su-
perficies vitrei fuerit sperica, non pertransibit axis iste per cen-
trum vitrei, et ipse pertransit per centrum superficiei glacialis.
Linee ergo que exeunt a centro glacialis ad puncta quorum dis-
tancia a puncto axis in superficie glacialis est equalis continent
75 cum axe apud centrum glacialis angulos equales. Et cum ita
est, et centrum glacialis non est centrum vitrei, iste linee distin-
guent ex superficie vitrei arcus inequales. Et nulle linee conti-
nentes cum axe angulos rectos et existentes cum axe in eadem
superficie distinguunt ex superficie vitrei duos arcus equales
80 nisi due linee tantum, et sunt ille que sunt in superficie secante
superficiem perpendicularem super superficiem vitrei. Cum
ergo axis fuerit declinans super superficiem vitrei, forme per-

52 fuerint: fiunt P1/post partes scr. et del. differentie P1 54 est: sunt L3P3; alter. in
sunt a. m. E 55 et om. EP3; inter. L3/erunt corr. ex runt Er 56 distantie corr. ex
substantie S/puncto corr. ex centro E 58 sunt corr. ex est a. m. E 60 distantie corr.
ex distantia P3/qui: quod EErP3RS 61 post cum scr. et del. ista P3/ita est transp. P3/
est: sit R 63 superficie corr. ex superficiei L3 65 similiter corr. ex simiter S/etiam
declarabitur transp. EP3R 66 ante vitrea scr. et del. g P1/quoniam (67): quod P1S
68 quando: cum P1S/pervenerint: pervenerit C1ErL3 69 erit . . . eorum: distabunt
inaequaliter R/inequalis om. R/quando axis (70) transp. C1Er 71 pertransibit:
pertransit P3 72 ipse om. R/pertransit: pertransibit EL3P3R 75 angulos equales
transp. P3 76 est^{1,2}: sit R/distinguunt (77): distinguunt EP3 77 linee inter. L3
78 et inter. L3/existentes corr. ex exeuntes a. m. E 79 distinguunt: distinguunt R/ex:
in P3/duos om. EP3R 81 cum . . . vitrei (82) om. P1; mg. a. m. S

venientes in superficie vitrei erunt diverse ordinationis, sive sit ista superficies plana sive spherica.

- 85 [2.23] Et cum axis fuerit perpendicularis super superficiem vitrei, erit perpendicularis super omnes differentias communes, et erunt quolibet due lineae exeuntes a centro glacialis, quod est punctus in axe, continentes cum axe angulos rectos et distinguentes ex differentia communi quae est in superficie vitrei duas
90 partes equales. Et erit distantia duorum punctorum quae sunt extremitates duarum partium equalium a puncto qui est super axem in superficie vitrei equalis, sive sit superficies vitrei plana sive spherica. Secundum ergo omnes dispositiones non pervenit forma ad superficiem vitrei et situs partium eius secundum
95 esse suum in superficie visus nisi axis perpendicularis sit super superficiem vitrei. Et sentiens non sentit formam nisi secundum suum esse apud perventum eius ad ipsum, et sentiens comprehendit ordinationem partium rei vise secundum suum esse in superficie rei vise. Non est ergo possibile ut forme
100 perveniant in superficie vitrei nisi sit ordinatio partium earum secundum suum esse. Ergo non est possibile ut axis radialis sit declinans super superficiem vitrei; erit igitur perpendicularis. Omnes ergo lineae radiales residue erunt obliquae super istam superficiem, sive sit plana sive sit spherica, quoniam
105 secant axem super centrum glacialis. Nulla autem linearum istarum transit per centrum superficiei vitrei, si fuerit spherica, nisi axis tantum, quoniam est perpendicularis super ipsam et quia centrum superficiei glacialis non est centrum superficiei vitrei. Et cum declaratum est quod forme pervenientes in superficie glacialis non perveniunt ad concavum nervi
110 nisi postquam fuerint oblique reflexe, et non est reflexio earum nisi apud superficiem vitrei, et axis est perpendicularis super

83 superficie: superficiem EP3R 84 post sive add. sit Er 86 omnes om. S/omnes differentias transp. P1 87 erunt om. R/post glacialis scr. et del. vel E 88 continentes cum axe: continebunt R/distinguentes (89): distinguunt R 89 ex: in P3
90 post sunt add. apud mg. L3 91 equalium om. P1/qui: quod R/super inter. P3
92 post sit add. per P1/superficies: superficiem P1 93 post sive add. sit EP3/omnes dispositiones transp. P1R 94 et: ut Er 95 perpendicularis sit transp. C1Er
97 suum om. P1; scr. et del. S/suum esse transp. EP3/perventum eius transp. EP3R/ ipsum: se R 98 ante partium scr. et del. re S 99 est ergo corr. ex ergo est S
100 superficie: superficiem R 101 earum: suarum R/suum esse transp. L3/ergo non est: non est ergo. EL3P3R 102 igitur: ergo L3R 103 post erunt scr. et del. obb C1 104 istam superficiem transp. P1RS/sit² om. C1Er 105 nulla autem: et nulla C1Er/autem: ergo EP1P3R/linearum istarum (106) transp. R 106 post centrum add. glacialis EP1P3 (scr. et del. glacialis P1) 108 superficiei: superficie Er
109 cum: quoniam R 110 ante in scr. et del. ad centrum P1/superficie: superficiem EP3R 111 reflexe: refractae R/non est om. C1Er/est om. P1/reflexio: refraction R/post earum add. non est C1Er 112 nisi: nec L3/apud: propter P1

istam superficiem, et omnes lineae radiales residuae sunt obli-
 quate super istam superficiem, quando forme perveniunt ad
 115 superficiem vitrei, obliquabuntur omnia puncta que sunt in ea
 preter punctum axis, quoniam iste punctus extenditur secun-
 dum rectitudinem axis quousque perveniat ad locum girationis
 concavi nervi. Nulla ergo forma perveniens ad superficiem
 glacialis extenditur ad concavum nervi secundum rectitudinem
 120 nisi punctus tantum axis, et omnia puncta residua perveniunt
 ad concavum nervi secundum lineas obliquatas.

[2.24] Cum ergo visus comprehenderit rem visam, et illa res
 visa fuerit opposita medio visus, et fuerit axis intra piramidem
 radialem continentem illam rem visam, forma illius rei vise
 125 perveniet ad superficiem glaciale[m] secundum rectitudinem
 linearum radialium. Deinde extenduntur forme ab ista super-
 ficie secundum rectitudinem linearum radialium etiam quous-
 que perveniant ad superficiem vitrei. Deinde punctus axis
 extendetur ab ista superficie secundum rectitudinem axis quo-
 130 usque perveniat ad locum girationis concavi nervi. Et omnia
 puncta residua obliquantur secundum lineas secantes lineas
 radiales et consimilis ordinationis quousque perveniant ad
 locum girationis concavi nervi. Perveniet ergo forma in isto
 loco ordinata secundum suum ordinem in superficie glacialis et
 135 secundum suam ordinationem in superficie rei vise. Sed dis-
 positio formarum obliquatarum non est sicut dispositio forma-
 rum extensarum recte, quoniam obliquatio necessario alterabit
 ipsas aliqua alteratione. Sequitur ergo de ista dispositione ut
 sit punctus perveniens ad locum girationis concavi nervi qui
 140 extendebatur secundum rectitudinem axis magis verificatus
 omnibus punctis formarum.

113 superficiem *corr. ex superficies C1/et . . . superficiem* (114) *mg. a. m. C1; om. Er/post*
 radiales *scr. et del. lineae P3* 114 pervenient: perveniunt L3; pervenerint R
 115 obliquabuntur: obliquantur L3; refringentur R 116 secundum (117): super C1
 118 perveniens *corr. ex veniens S* 119 glacialis: glaciale[m] S/nervi: nervum P3
 120 punctus: punctum P1RS/tantum axis *transp. EErP3R/perveniunt: pervenient EP3*
 121 obliquatas: refractas R 122 comprehenderit: comprehendit EP3R
 123 fuerit: sunt Er 125 perveniet: pervenit S/post superficiem *add. super P1S/*
glaciale[m] om. Er; corr. ex glacialis a. m. EP3 126 ab *corr. ex ad E* 127 etiam:
 et S 128 perveniant: perveniat C1Er/punctus: perventus P1; punctum R; *alter. in*
perventus L3; corr. ex perventus a. m. S 131 obliquantur: refringuntur R/secun-
 dum: super R 133 nervi *om. P1/isto: illo EL3P3; illum R* 134 loco: locum R/
 ordinem: ordinationem P3/post et *add. ordinata P3R* 136 obliquatarum *corr. ex*
obliquarum L3/post sicut scr. et del. s S/dispositio corr. ex dispositio P3 137 ne-
 cessario *om. EL3P1P3RS* 138 post alteratione *add. necessario EL3P3R/de inter. L3*
 139 punctus: punctum R/perveniens: veniens L3/qui: quod R 140 extendebatur
corr. ex extendebatur S/post axis add. sit R/verificatus: verificatum R; verticatus S

[2.25] Et etiam obliquatio punctorum pervenientium in
superficie obliquationis propinquiorum puncto axis magis est
minor et remotiorum maior, quoniam obliquatio non est nisi
145 secundum angulos qui fiunt ex lineis super quas forme veniunt
et ex perpendicularibus que sunt super superficiem obliquatio-
nis. Et lineae continentes cum perpendicularibus angulos mi-
nores erit obliquatio earum secundum angulos minores, et lineae
continentes cum perpendicularibus angulos maiores erit obli-
150 quatio earum secundum angulos maiores. Et lineae radiales
propinquiores axi minus declinant super superficiem obliqua-
tionis, et sic continent cum perpendicularibus que sunt super
superficiem obliquationis angulos minores. Et ille que sunt
remotiores ab axe magis declinant super superficiem obliqua-
155 tionis, et sic continent cum perpendicularibus angulos maiores.
Et forme quarum obliquatio est minor magis manifestantur, et
forme quarum obliquatio est maior minus. Punctus ergo qui est
super axem perveniens ad locum girationis concavi nervi est
manifestior omnibus punctis residuis, et quod est propinquius
160 illi est manifestius remotiori ab illo.

[2.26] Et iste forme sunt ille que extenduntur ad nervum
communem, et ex illis comprehendit ultimum sentiens formam
rei vise. Et cum ista forma perveniens ad locum girationis con-
cavi nervi est diverse dispositionis—scilicet quod punctus axis
165 est manifestior omnibus punctis residuis, et quod est propin-

142 obliquatio: refractio R/pervenientium: provenientium L3S 143 superficie
obliquationis: superficiem refractionis R/propinquiorum: propinquorum C1P3S;
propinquarem EL3/magis om. R 144 post minor add. obliquatio EP3/post quoniam
add. tertia EP3/obliquatio: refractio R 145 fiunt: fuerit C1Er/ex om. L3/forme
veniunt transp. C1Er 146 et: etiam P3; om. C1/super om. Er/obliquationis (147):
refractionis R 147 lineae continentes: linearum continentium R 148 obliquatio:
refractio R 149 maiores: minores P1/obliquatio (150): refractio R 150 earum
om. R/radiales om. R 151 obliquationis (152): obliquationes P3; refractionis R
152 et... obliquationis (153) mg. a. m. C1; om. Er/continent cum perpendicularibus (??)
C1/super... sunt (153) mg. L3 153 obliquationis: refractionis R/angulos...
obliquationis (154/155) mg. a. m. S/que: qui S 154 declinant: declinantur P1S/
obliquationis (155): refractionis R 155 continent: continet P1S 156 obliquatio:
refractio R/post minor scr. et del. m Er/manifestantur: manifestatur C1ErS; corr. ex
manifestantur P1/post manifestantur scr. et del. et forme quarum obliquatio est minor
magis manifestantur E/et: quam C1Er 157 forme om. R/obliquatio: refractio R/
post maior scr. et del. n C1/minus om. C1Er; inter. L3/post minus inter. manifestantur L3/
punctus: punctum R/ergo inter. L3/qui: quod R 158 super... perveniens:
perveniens... axem L3/post super scr. et del. superficiem EP3/concavi nervi
transp. EP3R 159 post omnibus add. aliis EP3R/quod: quid E; alter. ex quid in qui
P3/propinquius: propinquior P3; propinquum R 160 illi: isti EP1P3S; om. L3/
manifestus: manifestior P3/remotiori: remotiore R 161 ille om. EP3R
163 perveniens: perveniat L3 164 est: sit R/punctus: punctum R 165 mani-
festior: manifestus R/post residuis add. forme P1S

quius illi est magis manifestum post—forma perveniens in nervo communi ex qua comprehendit virtus sensitiva formam rei vise erit diverse dispositionis. Et punctus eius respondens puncto axis in superficie rei vise est manifestior omnibus
 170 punctis residuis forme, et ei propinquius manifestus.

[2.27] Et cum inducantur dispositiones rerum visarum, et distinguatur qualitas comprehensionis visus a rebus visis quas comprehendit visus in simul et qualitas comprehensionis visus a partibus unius rei vise, invenientur convenientes huic quod
 175 determinavimus. Quoniam aspiciens quando in eodem tempore fuerit oppositus multis rebus visibilibus, et visus eius fuerit quietus, et non moverit ipsum, inveniet rem visam oppositam medio sui visus manifestiorem illis que sunt a parte laterum illius medii, et quod est propinquius medio erit manifestus. Et
 180 similiter quando inspiciens inspexerit rem visam magnam, et visus eius fuerit oppositus medio illius rei vise, et fuerit quietus, comprehendet medium illius rei vise manifestius illius rei extremitatibus. Et hoc manifestabitur bene quando fuerint multa visibilia sibi propinqua, et aspiciens fuerit oppositus uni
 185 illorum quod erit medium inter illa visibilia, visu quieto, quoniam tunc comprehendet comprehensione manifesta illud medium; et cum hoc etiam comprehendet illa que sunt in lateribus illius, sed non manifeste. Et hoc manifestatur magis quando spatium super quod sunt illa visibilia fuerit longum, quoniam
 190 tunc erit inter comprehensionem medii et comprehensionem extremitatum magna diversitas.

[2.28] Deinde si hec species motus moverit suum visum in aspiciente et fuerit oppositus alii rei vise preter illam rem visam que ante erat opposita, comprehendet istam secundam
 195 comprehensione manifesta. Primam autem comprehendet comprehensione debili. Et si fuerit oppositus extremitati et intueatur ipsam, comprehendet ipsam comprehensione mani-

166 magis . . . post: remotiore manifestus *R/post* forma *add.* ergo *R* 168 punctus: punctum *R* 169 est manifestior: erit manifestus *R* 170 punctis *inter. L3/ei:* huic *R/post* ei *inter. punctum L3/post* manifestus *add.* remotiore *R* 171 cum: si *R* 172 visis *corr. ex* visus *S* 173 comprehendit: comprehenderit *R/in om. R* 174 *post* vise *scr. et del. et L3/ante* huic *add.* omnino *P1S/huic:* in hoc *R* 175 determinavimus: declaravimus *P1RS/eodem corr. ex edem S* 178 manifestiorem *corr. ex* manifestior est *a. m. C1* 179 illius: ipsius *P1S/quod:* quae *R/propinquius:* propinquior *R/manifestus:* manifestior *R* 181 medio *corr. ex* magno *P1/fuerit²:* fuit *L3* 182 illius²: istius *C1EerP3R* 184 fuerit: fuit *L3* 185 visu: visui *EL3P1P3/visu* quieto *transp. RS* 186 comprehensione: comprehensio *P3* 187 cum *om. EP3/cum* hoc: simul *R/etiam om. EL3P3* 192 suum *om. R* 193 rem *om. P3/visam* (194) *om. P1S* 194 *post* secundam *add.* rem visam *EP3R* 196 comprehensione *corr. ex* comprehensio *P3* 197 intueatur: intuetur *P3/manifestiori* (198): manifestiore *R*

festiori quam in comprehensione prime dispositionis secundum
eius remotionem ab eo, et cum hoc comprehendet medium
200 comprehensione debili, quamvis sit propinquius. Et erit inter
comprehensionem medii apud oppositionem eius extremitati et
inter comprehensionem medii apud oppositionem eius ipsi
medio illius diversitas sensibili.

[2.30] Manifestabitur ergo ex hac experimentatione quod
205 visio per medium visus et per axem quem distinximus est
manifestior visione per extremitates visus et per lineas conti-
nentes axem. Declaratum est ergo quod visio erit per axem
piramidis radialis manifestior quam visio per omnes lineas
radiales et quod visio per illud quod propinquius est axi est
210 manifestior quam per illud quod est remotior.

[CAPITULUM 3]

[3.1] Sensus quidem visus nichil comprehendit de rebus
visibilibus nisi in corpore. In corpore autem multe res congre-
gantur et accidunt ei multe res, et visus comprehendit de cor-
poribus multas res que sunt in eis et que accidunt illis. Et color
5 est unum eorum que accidunt corporibus, et similiter lux, et
sensus visus comprehendit utrumque istorum in corporibus. Et
comprehendit etiam alias res preter istas duas, sicut figuram,
et situs, et magnitudinem, et motum, et alia que nos distingue-
mus post. Et comprehendit etiam consimilitudinem colorum et
10 diversitatem eorum, et consimilitudinem lucis et diversitatem
eius. Et similiter etiam comprehendit consimilitudinem figura-

199 cum hoc: simul *R/post medium add. in L3* 200 propinquius: propinquus *C1S/*
erit . . . comprehensionem (201): inter . . . erit *S* 201 *post medii scr. et del. app C1/*
apud . . . eius: dum aspiciens opponitur R/oppositionem: oppositum P3/extremitati
. . . eius (202) om. S 202 *apud . . . ipsi: dum opponitur R/oppositionem: opposi-*
tum L3 203 *illius om. R* 204 *ergo ex hac: ex hac ergo L3/post hac scr. et del.*
in C1 205 *quem: que P1/distinximus: definivimus R* 206 *post manifestior add.*
quod P1/visione: visio P1S/visus om. R 207 *declaratum . . . axem om. P3*
209 *illud: istud P1S/illud . . . est¹: propinquiores R* 210 *quam corr. ex quod a. m. S/*
illud . . . remotior: remotiores R/remotior: remotius EP3; alter. in remotius L3
1 *comprehendit: comprehendet Er* 2 *autem: vero R/multe res transp. EP3R*
3 *et¹ . . . res inter. L3/post accidunt add. etiam C1Er/ei: eis EP3/post visus scr. et del.*
prima dies lucem prebet creat altera celum secunda pelago tertia germen humo sub
quarta stellas sub quinto S 4 *res om. Er* 5 *post unum scr. et del. est L3*
6 *istorum: illorum Er* 7 *comprehendit: comprehendat S* 8 *et² inter. S/ante et³*
scr. et del. et S/nos distinguemus (9) transp. L3P1S 9 *consimilitudinem: similitudinem*
EL3P3R/et² . . . lucis (10) om. Er 10 *consimilitudinem: similitudinem EL3P3R/*
diversitatem²: diversitatis L3 (post diversitatis inter. esse) 11 *eius om. P3/*
comprehendit: comprehendet S

rum, et situum, et motuum.

[3.2] Et comprehensio omnium istorum non est secundum
unum modum, nec comprehensio cuiuslibet istorum est sensu
15 solo. Quoniam visus quando comprehendit duo individua in
eodem tempore, et fuerint consimilia in forma, comprehendet
individua, et comprehendet que sunt similia. Sed consimilitu-
do duarum formarum individuorum duorum non est ipse forme
nec una illarum.

20 [3.3] Et cum visus comprehendit individua ex formis per-
venientibus ad ipsum visum ex duobus individuis, ipse ergo
comprehendit consimilitudinem duorum individuorum ex simi-
litudine duarum formarum pervenientium a forma ad visum.
Et consimilitudo duarum formarum non est ipse forme nec ter-
25 tia forma propria consimilitudini.

[3.4] Et etiam consimilitudo duarum formarum est con-
venientia illarum in aliquo. Non ergo comprehendetur duarum
formarum similitudo nisi ex comparatione unius ad alteram et
ex comprehensione istius in quo sunt consimiles. Et cum visus
30 comprehendit similitudinem, et non est in eo tertia forma ex
qua comprehendit similitudinem, visus ergo non comprehendit
similitudinem duarum formarum nisi ex comparatione unius
ad alteram.

[3.5] Et similiter comprehendit visus diversitatem duarum
35 formarum diversarum ex comparatione unius ad alteram.

[3.7] Et cum ita est, comprehensio ergo sensus visus a simi-
litudine formarum et diversitate illarum non est per solum
sensum sed per comparisonem formarum adinvicem.

12 situum: situm P1; corr. ex situm a. m. S/motuum: motum P1; corr. ex motum a. m. S
13 et: sed C1Er 14 unum modum transp. S/sensu solo (15) transp. EP3R
15 visus quando transp. L3/comprehendit: comprehenderit C1Er/post individua scr. et
del. et comprehendet que sunt similia S/in om. C1Er 17 et . . . individua (20) mg.
a. m. E/que alter. in quoniam a. m. C1/ que sunt om. EL3P3R/consimilitudo (18): simi-
litudinem EL3P3 18 duarum corr. ex darum Er/individuorum duorum: in duobus
individuus R; transp. EP3/est: sunt R 19 ante nec add. ambae R 20 et: sed C1Er/
comprehendit: comprehendunt P1; comprehendet S; corr. ex comprehenditur P3/
perveniuntibus (21) corr. ex pervenientibus P1 21 ipsum om. C1ErL3/visum om.
EP3R/ex: in P3/ergo om. R 22 consimilitudinem corr. ex similitudinem L3
24 consimilitudo: similitudo P3/est: sunt R/tertia (25) om. P3; inter. a. m. E/tertia forma
(25) transp. C1Er 26 et etiam: sed R 27 in om. S 28 ex inter. a. m. E/unius
corr. ex illius P3/alteram: alterum C1ErL3P1S 29 comprehensio corr. ex
comprehensio P3/istius: illius C1Er/consimiles: similes C1Er; corr. ex similia S/cum:
quia R 30 et inter. S/post est scr. et del. et S 31 qua: quo EP1S/visus . . .
similitudinem (32) om. P1 32 ex om. P1 34 et . . . alteram (35) om. R
35 diversarum om. P1/comparatione corr. ex comparatio C1P3 (a. m. C1)/post unius scr.
et del. v P3 36 est: sit R/visus om. P1/a corr. ex ad C1/similitudine (37):
consimilitudine C1EErP1P3R 37 post per scr. et del. illum P3/solum sensum (38)
transp. P3 38 per om. P1/adinvicem: inter se R

[3.8] Et etiam quando visus comprehendit duos colores
 40 unius generis, et fuerit unus illorum fortior altero, sicut viride
 mirti et viride fistici, comprehendet que sunt viridia, et com-
 prehendet etiam quod alterum illorum est fortioris viriditatis.
 Et distinguet inter duas viriditates, et comprehendet consimili-
 tudinem eorum in viriditate et diversitatem illorum in fortitu-
 45 dine et debilitate.

[3.9] Sed distinctio inter duas viriditates non est ipse sen-
 sus viriditatis, quoniam sensus viriditatis est ex viridificatione
 visus et ex viridificatione visus ab utraque viriditate, et com-
 prehendet quod sunt unius generis. Comprehensio ergo visus
 50 quod altera viriditas est fortior altera et quod due sunt unius
 generis est distinctio colorationis que est in visu, non ipse sen-
 sus coloris.

[3.10] Et similiter, quando duo colores sunt consimiles in
 fortitudine et fuerint unius generis, quoniam visus comprehen-
 55 dit duos colores, et comprehendit quod unius generis sunt et
 quod sunt consimiles in fortitudine.

[3.11] Et similiter est dispositio lucis apud visum, quoniam
 visus comprehendit lucem et distinguit inter lucem fortem et
 debilem.

[3.12] Comprehensio ergo visus quoad consimilitudinem
 colorum et diversitatem eorum, et consimilitudinem lucis et
 diversitatem eius, et consimilitudinem lineationum formarum
 rerum visibilium, et figure et situs earum, et diversitates illarum
 non est nisi ex comparatione illorum adinvicem, non solo
 65 sensu.

[3.13] Et etiam sensus visus comprehendit diafonitatem
 corporum diafonorum et diafonitatem corporum que non sunt

39 comprehendit: comprehenderit C1ErL3 40 fuerit: sit P1S/post unus scr. et del.
 color fortior C1/fortior om. C1/altero om. P3/viride: viridem R 41 mirti: mixti EP3;
 corr. ex mixti a. m. P1/viride fistici: viridem levistici R/que: quod C1EErP3/viridia:
 virides R 42 quod rep. Er/est corr. ex et L3 43 distinguet: distinguetur C1Er;
 distinguent P1 44 eorum: illorum EP3/viriditate: viriditatem P3 46 sed: et L3
 47 viridificatione: viridicatione C1P3; diversificatione P1; alter. ex verificatione in
 diversificatione L3; alter. ex diversificatione in verificatione a. m. S 48 et . . . visus
 om. P1R/ex om. L3/viridificatione: viridicatione C1/post visus² scr. et del. vel E/viriditate:
 viriditatem Er/et² om. C1Er/comprehendet (49): comprehendit C1Er 51 est¹: et Er;
 corr. ex et a. m. C1/est distinctio om. P3 53 sunt: fuerint C1Er; om. R/consimiles:
 similes EP3R 54 et om. R/quoniam om. R; corr. ex quam a. m. E 58 et¹:
 etiam P3 60 consimilitudinem: similitudinem L3 61 colorum . . .
 consimilitudinem (62) mg. a. m. S 62 lineationum corr. ex lineationis P1 63 et²
 inter. L3/illarum: earum EP3R 64 non . . . adinvicem rep. P1/illarum adinvicem:
 illarum inter se R 66 etiam om. EP3/post visus add. non EP3 67 ante et inter. et
 etiam diafonorum L3/et . . . corporum om. L3/que . . . sunt corr. ex que sunt L3/non om.
 EP1P3R/non sunt corr. ex sunt non C1

in fine diafonitatis, sed non comprehendit diafonitatem talem
 ratione nisi per comparisonem. Quoniam lapides diafoni
 70 quorum diafonitas est modica non comprehenduntur a visu
 esse diafoni nisi postquam fuerint oppositi luci, et comprehen-
 detur lux a posteriori eorum, et comprehendetur quod sunt
 diafona. Et similiter diafonitas cuiuslibet corporis diafoni non
 comprehendetur a visu nisi postquam comprehendetur corpus
 75 aut lux que est a posteriori eius, et comprehendetur cum hoc
 per distinctionem quod illud quod appareat a posteriori est
 diversum a corpore diafono.

[3.14] Comprehensio autem eius quod illud quod est a
 posteriori corporis diafoni est diversum ab illo corpore non est
 80 comprehensio solo sensu, sed est comprehensio per rationem.
 Et cum diafonitas non comprehendetur nisi per signationem,
 ergo non comprehendetur nisi distinctione et ratione.

[3.15] Et etiam scriptura non comprehendetur nisi ex dis-
 tinctione formarum litterarum, et compositione illarum, et
 85 comparatione illarum ex sibi similibus que sunt note scriptori
 ante. Et similiter multe res visibiles quando considerabitur
 qualitas comprehensionis illarum, invenietur quod non com-
 prehenduntur solo sensu sed ratione et distinctione.

[3.16] Et cum ita est, non ergo omne quod comprehenditur
 90 a visu comprehenditur solo sensu; sed multe visibiles intenti-
 ones comprehenduntur per rationem et distinctionem cum
 sensu forme vise.

[3.17] Visus autem non habet virtutem distinguendi, sed
 virtus distinctiva distinguit istas res. Sed distinctio virtutis
 95 distinctive in istis rebus visibilibus non est nisi mediante visu.

68 *post talem add. tali P1S; add. alia R* 69 *comparisonem corr. ex verticationem P1*
 70 *post est scr. et del. max P1/comprehenduntur: comprehenditur EErP3; corr. ex*
comprehenditur a. m. C1 71 *postquam corr. ex quando L3/fuerint: fuerit EP1P3/*
oppositi: oppositum EP3/comprehendetur (72): comprehendatur R 72 *compre-*
hendetur: comprehenduntur P1RS 74 *comprehendetur¹: comprehenditur R/*
comprehendetur²: comprehensum fuerit R 75 *comprehenditur cum hoc: compre-*
hendatur insuper R 79 *corporis: corpus S; om. EP3/est² . . . sed (80) mg. a. m. S*
 80 *sensu: sensus P3* 81 *comprehendetur: comprehendatur R/signationem:*
significationem C1EerL3P3 ((?) EP3); alter. in signationem a. m. S 82 *distinctione*
corr. ex distinctio P3/post ratione scr. et del. et P3 83 *etiam inter. L3/comprehendetur:*
comprehenditur R 84 *litterarum: litteratarum L3P1S; alter. in litteratarum EP3/post*
illarum scr. et del. et compositione L3 85 *ex corr. ex et a. m. C1/sibi similibus transp.*
L3/note: noti Er 86 *visibiles corr. ex visibiles P3* 87 *invenietur: inveniatur Er;*
om. R/quod om. R/comprehenduntur (88): comprehenduntur C1Er 88 *post sed add.*
multe P1S 89 *est: sit R/ergo omne transp. C1Er* 90 *a . . . comprehenditur inter.*
L3/ comprehenditur: comprehendetur C1Er/visibiles intentiones (91) transp. EP3R
 91 *comprehenduntur: comprehenduntur EL3P3R* 92 *post forme inter. rei C1L3*
(a. m. C1) 94 *distinctiva: distinctam Er/sed: attamen R*

[3.18] Et etiam visus comprehendit multas res visas per cognitionem, et cognoscit hominem esse hominem, et equum equum, et Socratem esse Socratem quando viderit ipsum prius. Et cognoscit animalia sibi assueta, et arbores, et plantas, et lapides, quando prius vidit ipsa et sibi consimilia. Et cognoscit omnes intentiones sibi assuetas in rebus visibilibus.

[3.19] Et non comprehendit visus quiditatem alicuius rei vise nisi per cognitionem. Cognitio autem non est comprehensio solo sensu, quoniam visus non cognoscit omne quod videt prius. Et cum visus comprehenderit aliquod individuum, et postea separabitur ab illo longo tempore, et post viderit ipsum, et non fuerit rememorans ipsius, non cognoscit ipsum, quoniam non cognoscit illud quod cognovit nisi quando fuerit rememorans. Si ergo cognitio esset comprehensio solo sensu, oporteret quando visus videret aliquod individuum quod prius vidit quod statim cognosceret ipsum in secunda visione secundum omnes dispositiones, sed non ita est.

[3.20] Et cum cognitio non est nisi per rememorationem, cognitio ergo non est comprehensio solo sensu. Comprehensio autem per cognitionem est comprehensio per aliquem modorum rationis, quoniam cognitio est comprehensio consimilitudinis duarum formarum--scilicet forme quam comprehendit visus apud cognitionem et forme quam comprehendebat illius rei vise, vel sibi similis, in prima vice vel prioribus vicibus. Et propter hoc non erit cognitio nisi per rememorationem, quoniam si prima forma non fuerit presens memorie, non comprehendet visus similitudinem duarum formarum, et sic non cognoscet rem visam.

[3.21] Cognitio autem est forme alicuius rei individue et

97 cognoscit: cognovit L3; cognoscit P1 99 et^{3,4} om. L3P1S 100 post lapides scr. et del. prius P1/vidit: viderit EP3R/sibi om. R/post et² scr. et del. g P3 101 sibi . . . visibilibus: in rebus visibilibus sibi assuetas R 103 post est scr. et del. nisi P1 104 videt: vidit R; alter. in vidit C1 105 comprehenderit: comprehendit P1P3S 106 illo: eo L3 107 fuerit: fuit C1/rememorans: memor R/cognoscit: cognosceat C1EErL3P3R 108 quoniam . . . rememorans (109) om. P3 109 rememorans: memor R 110 post quando scr. et del. sensus E/visus videret transp. EP3R 112 ita est transp. C1ErR 113 post nisi scr. et del. per rememorationem S/rememorationem corr. ex rememtionem L3 115 post est scr. et del. ali P1/post comprehensio scr. et del. a Er/aliquem: aliquam EP3 116 rationis: ratiocinationis EP3R/cognitio: ergo P3/est: et EL3P3 117 ante duarum scr. et del. o P1 118 quam comprehendebat om. R 119 similis: similitudinem EL3P3; similitudinum C1Er/post similis add. quam comprehendebat R/post in scr. et del. potentia P1/vel² . . . vicibus om. R/vicibus: visibus Er 120 post erit add. comprehensio P3 122 similitudinem: consimilitudinem C1Er/cognosceat (123): cognoscit P3R; corr. ex cognoscit E 124 est forme transp. C1Er/forme: forte C1

125 forme speciei. Cognitio ergo individui est ex assimilatione
forme individui quam comprehendit visus apud cognitionem
individui alii forme quam prius comprehendebat. Et cognitio
speciei est ex assimilatione forme rei vise ad alias formas sibi
similes in individuis sue speciei que prius comprehendebat.

130 [3.22] Et comprehensio similitudinis est comprehensio per
rationem, quoniam non est nisi ex comparatione unius forma-
rum ad alteram. Cognitio ergo non est nisi modus rationis; sed
ista ratio distinguitur ab omnibus rationibus, quoniam cognitio
non erit per inductionem omnium intentionum que sunt in for-
135 ma, sed erit per signa. Cum ergo visus comprehendit aliquam
intentionum que sunt in forma, et fuerit memorans prime for-
me, statim cognoscet formam. Et non est ita omne quod com-
prehenditur per rationem, quoniam plura eorum que compre-
henduntur per rationem non comprehenduntur nisi post induc-
140 tionem omnium intentionum que sunt in eis.

[3.23] Quoniam scriptor, quando momento aspexerit for-
mam ABCD, statim comprehendet quod est ABCD. Ex com-
prehensione ergo eius quod A est precedens et D est ultimum,
comprehendit quod est ABCD. Et similiter, si viderit DOMI-
145 NUS scriptum, statim comprehendit ipsum per cognitionem et
consuetudinem. Et similiter omnes dictiones sibi assuetas;
quando scriptor viderit ipsas, statim comprehendet sine indi-
gentia distinctionis unius ab altera. Et non est ita si scriptor
inspexerit dictionem extraneam scriptam quam ante non vidit,
150 quoniam scriptor non comprehendet istam dictionem nisi
postquam distinxit eius litteras, et post comprehendit
dictionem. Omnis ergo forma quam prius non vidit visus nec
similem sibi, quando comprehenditur a visu, non compren-
det visus quid est illa forma nisi postquam distinxit omnes

125 forme *corr. ex forte a. m. C1; alter. in forte L3/individui corr. ex individue Er*
127 comprehendebat: comprehendat P3 128 forme *inter. L3/alias corr. ex aliquid*
P1/sibi om. R 129 in *om. EP3R/sue om. L3/que: qui Er* 130 similitudinis:
consimilitudinis P3 131 formarum (132): forme R 132 cognitio ergo *transp.*
C1Er/post modus add. ratiocinationis vel EP3 133 *post ista scr. et del. o P3*
134 *post erit add. nisi EP3* 136 fuerit: fuit L3/memorans: memor R 137 com-
prehenditur (138): comprehendit R 138 eorum: illorum C1Er/comprehenduntur
(139) *corr. ex comprehenditur Er* 139 comprehenduntur: comprehenduntur C1ErL3
140 sunt *corr. ex fiunt P3* 141 scriptor quando *transp. C1Er/quando: quoniam L3*
142 ABCD¹: ABC R/ABCD²: ABC *ErL3P3R; corr. ex ABC a. m. C1/comprehensione*
(143): apprehensione EP3R 143 ergo *om. P1/ergo eius transp. S/post quod add. est*
P1/D: C R 144 ABCD: ABC R/si viderit *om. P1* 146 dictiones: dispositio-
nes R 147 ipsas: ipsam P1S 149 inspexerit: aspexerit P3/scriptam: scripturam
P1S/vidit alter. in novit a. m. S 150 quoniam *corr. ex quam Er* 153 sibi: illi R
154 quid: quod R

155 illas intentiones illius forme aut plures illarum.

[3.24] Forma autem consueta comprehenditur a visu statim comprehensione quarumdam intentionum que sunt in illa forma. Illud ergo quod comprehenditur per cognitionem comprehenditur per signum, et non omne quod comprehenditur
160 per rationem comprehenditur per signum. Et plures intentiones visibilium non comprehenduntur nisi per cognitionem, et non comprehenditur quiditas alicuius rei vise nec alicuius rei sensibilis alio sensu nisi per cognitionem. Et virtus cognitionis est coniuncta virtuti sensus, et non completur comprehensio
165 sensibilium nisi per cognitionem.

[3.25] Cognitio autem non est solo sensu. Intentiones ergo que comprehenduntur sensu visu quedam comprehenduntur solo sensu, et quedam per cognitionem, et quedam per rationem et distinctionem.

[3.26] Et etiam plures intentiones visibilium que comprehenduntur per rationem et distinctionem comprehenduntur in tempore valde parvo, et non apparet quod comprehensio earum sit per rationem et distinctionem propter velocitatem rationis per quam comprehenduntur iste intentiones. Quoniam
170 figura, et magnitudo, et diafonitas corporis, et sibi similia ex intentionibus que sunt in rebus visibilibus, comprehenduntur in maiori parte comprehensione valde veloci. Et non comprehenditur tunc quod comprehensio earum sit per rationem. Et cum comprehensio istarum intentionum est per rationem, non est
175 nisi propter manifestationem positionum illarum et per consuetudinem virtutis distinctive ad istas intentiones. Apud ergo istum eventum istius forme, comprehendit omnes intentiones
180

155 illas *om.* C1Er/post illas *add.* distinctiones vel EP3/intentiones *corr.* ex distinctiones L3 156 comprehenditur: comprehenditur P3/a visu *om.* P1S 157 ante comprehensione *add.* ex C1Er 159 comprehenditur: comprehenditur C1Er
160 comprehenditur: comprehenditur EP3R 162 comprehenditur: comprehenditur P3/post comprehenditur *scr. et del.* per signum S 163 et . . . cognitionem (165) *mg.* a. m. EC1; *om.* Er 164 completur: comprehenditur complete P3 165 sensibilibus: visibilium EP3R 166 sensu *corr.* ex sensus P3/ergo que (167) *corr.* ex que ergo S 167 que: quedam EL3P3/comprehenduntur¹: comprehenditur P3/ante sensu *add.* solo EP3 (*inter.* a. m. E); *add.* a R/comprehenduntur² *om.* C1EErL3P3S 168 et¹ *om.* R/post quedam¹ *scr. et del.* quedam P3/cognitionem: distinctionem P3/et² *om.* EP3R/per rationem (169) *corr.* ex rationem per Er 170 etiam *om.* EP3R/post intentiones *add.* sensibilibus EP3 (*alter.* ex visibilium P3) 171 per . . . comprehenduntur *inter.* L3; *om.* P3 172 tempore *corr.* ex corpore Er/earum (173): eorum Er 173 ante propter *scr. et del.* comprehenduntur S 175 figura *corr.* ex figura S/sibi *om.* R 177 post et *add.* quod C1ErL3/comprehenditur (178) *corr.* ex comprehenduntur P1 178 tunc *om.* Er; *mg.* a. m. C1/quod *inter.* L3/earum: eorum Er/cum *inter.* a. m. E 179 ante est¹ *add.* que S 180 propter: per EP3R; *corr.* ex per L3/post propter *add.* secundum Er/et *om.* S/post et *add.* est L3P1P3S 181 ergo . . . eventum (182): istum . . . ergo R 182 istum *om.* C1ErL3P3R/eventum: perventum EP3R/istius: illius R

que sunt in ea, et sic distinguuntur ab eo apud comprehensi-
onem.

185 [3.27] Et similiter argumentatio et omnes rationes quarum
propositiones sunt universales et manifeste; non indiget virtus
distinctiva aliquanto tempore etiam in comprehendendo suas
conclusiones, sed apud intellectum statim propositionis intelli-
getur conclusio.

190 [3.28] Et causa in hoc est quod virtus distinctiva non argu-
it per compositionem et ordinationem propositionum, sicut
componitur argumentatio per vocabula, quoniam argumentum
quod concludit non erit argumentum secundum verbum nec
secundum ordinationem propositionum. Argumentum autem
195 virtutis distinctivae non est ita, quoniam virtus distinctiva com-
prehendit conclusionem sine indigentia in verbis et sine indi-
gentia ordinationis propositionum et ordinationis verborum.

[3.29] Quoniam ordinatio verborum argumenti non est nisi
modus qualitatis comprehensionis virtutis distinctivae a conclu-
sione, sed comprehensio virtutis distinctivae ad conclusionem
200 non indiget modo qualitatis nec ordinatione qualitatis compre-
hensionis.

[3.30] Intentiones ergo visibiles que comprehenduntur rati-
one comprehenduntur pluries valde velociter, et non apparet in
205 maiori parte si comprehensio earum sit in ratione. Et etiam in-
tentiones visibiles que comprehenduntur per rationem et dis-
tinctionem, quoniam multotiens comprehenduntur per ratio-
nem, et intellexerit virtus distinctiva intentiones earum, si post
viderit ipsas, comprehendet eas per cognitionem sine indigen-
210 tia distinctionis omnium intentionum que sunt in secundis, sed
per signa tantum. Et distinguet illam conclusionem per cogni-

183 comprehensionem (184): apprehensionem L3P1S 185 argumentatio . . .
rationes: in argumentatione et in omnibus rationibus R/et²: quod Er; corr. ex quod
a. m. C1 187 etiam om. P1R/suas: illarum R 188 statim propositionis transp.
C1ErL3/post propositionis add. statim P3 190 quod: quia P1S; alter. in quia a. m. C1/
distinctiva corr. ex sensitiva P1 191 propositionum: propositionis EL3P3R
192 argumentatio mg. P1/post quoniam scr. et del. ag Er 193 quod inter. S; corr. ex
quoniam Er/concludit: concluderunt P1/post concludit scr. et del. quod S/non om. R/
argumentum om. EP3R/nec: sed Er; et R; corr. ex sed a. m. C1; alter. in sed L3 196 in
corr. ex tamen a. m. E 197 propositionum: propositionis L3 198 post quoniam
scr. et del. odi P3/argumenti om. L3/post nisi add. argumenti L3 201 ordinatione:
ordine EP3R 203 post comprehenduntur add. a R 204 pluries: ut plurimum R
207 quoniam: quando P1S/multotiens om. P1/comprehenduntur corr. ex distingu-
untur P3 208 intellexerit: intelligit P3R; alter. in intelligit a. m. E/post: primo P1S
210 ante distinctionis scr. et del. a L3/distinctionis corr. ex consuetudinis a. m. E/post
sunt scr. et del. in eis vel E/secundis: illis C1Er; alter. in illis L3; alter. in eis a. m. S
211 illam: illa L3P3

tionem sine indigentia argumentationis alicuius iterande, et est exemplum in eo scriptore qui primo videt verbum extraneum.

[3.31] Et similiter omnes intentiones que comprehenduntur
 215 per rationem quando propositiones earum fuerint manifeste et conclusiones fuerint vere; quoniam quando anima intellexerit conclusionem esse veram, deinde multotiens venerit anime, erit conclusio quasi propositio manifesta. Et sic quando anima viderit propositionem, statim intelliget conclusionem sine indigentia argumentationis iterande.
 220

[3.32] Et plures intentiones quas non comprehendit virtus distinctiva quod sint vere nisi per rationem putatur quod sint propositiones prime, et quod non comprehendantur nisi per naturam et intellectum, non per rationem. Verbi gratia, quod
 225 totum sit maius parte, et putatur quod natura intellectus iudicet quod sit verum, et quod comprehensio veritatis ipsius non est per rationem. Sed totum esse maius parte non comprehenditur nisi per rationem, quoniam distinctio non habet viam ad comprehendendum quod totum est maius sua parte nisi postquam intellexerit intentionem totius, et partis, et intentionem
 230 maioritatis. Quoniam si non intellexerit intentionem partium, non intelliget intentionem totius. Intentio autem totius non est nisi omnitias, et intentio partis non est nisi aliquiditas, et maioritas est relatio ad alterum, et intentio maioris est illud quod
 235 est equale alii et plus. Et probatio quod omne totum est maius sua parte est quod refertur ei cum quadam equivalentia et addit super ipsam cum residuo. Et ex convenientia intentionis maioris cum intentione totius in augmentatione, apparet quod

214 et *mg.* P3/post similiter *add.* sunt R 215 quando: quoniam *ErL3*; *corr.* ex quoniam C1 217 veram *corr.* ex verum P3/anime: in animam R 219 conclusionem *corr.* ex conusionem a. m. S 220 post iterande *scr.* et *del.* et exemplum est P1 222 putatur: putantur EP1P3RS; *corr.* ex putantur L3 224 verbi gratia *inter.* a. m. E 225 post maius *add.* sua EP3R/et: etiam P1S; *om.* R/iudicet (226): indicet P1S; indigeret P3; *corr.* ex indiget a. m. E 226 quod *om.* C1Er 227 esse: omne C1Er; est RS/post maius *add.* sua R/comprehendetur (228): comprehendet EP3R 228 ante nisi *add.* prius EP3R/post rationem *scr.* et *del.* q S/distinctio: distinctiva P3; *corr.* ex distinctiva a. m. E/ad *inter.* L3 229 est: sit R/maius: magis P1S/sua *om.* C1Er 230 intentionem¹: intentiones EP3R; post intentionem² *scr.* et *del.* n C1 231 post maioritatis *add.* et minoritatis EP1P3R 232 intentionem *om.* C1Er; *mg.* L3; *inter.* a. m. S 233 post nisi¹ *add.* a C1EP3/omnitias: communitas *ErL3P1RS*; coniunctis P3; alter. in communitas a. m. C1; alter. ex coniunctis in communitas a. m. E/non est *om.* EErP1P3RS; *mg.* a. m. C1 234 post intentio *scr.* et *del.* in C1 235 post equale *add.* ei P3/et plus *mg.* a. m. C1; *inter.* a. m. Er 236 post parte *add.* et L3; est quod: ad quam C1Er/refertur: confertur R/ei *om.* C1Er/equivalentia: ea Er; *corr.* ex equidistantia L3; alter. ex ea in continentia a. m. C1/et *scr.* et *del.* C1 237 super: supra EL3P3/ipsam: ipsum C1Er/post residuo *add.* quod est plus EP3R (post plus *add.* scilicet ER) 238 in: et R/augmentatione: argumentatione EP3R; aumentatione S; *corr.* ex argumentatione L3

240 totum sit maius parte. Et cum comprehensio eius quod totum sit maius parte non est nisi per istam viam, comprehensio ergo eius non est nisi per rationem, non per naturam intellectus. Et illud quod est in natura intellectus non est nisi comprehensio convenientie intentionis totius et intentionis maioris in augmentatione tantum.

245 [3.33] Et ordinatio istius sillogismi est ita: omne totum addit super partem; et omne addens super aliud est maius ipso; ergo omne totum est maius sua parte. Et velocitas comprehensionis virtutis distinctive circa conclusionem non est nisi quia propositio universalis est manifesta. Sed comprehensio
250 virtutis distinctive quod totum est maius sua parte est per rationem, et quia propositio universalis est ei manifesta, comprehendet conclusionem apud eventum propositionis minoris particularis, et propositio particularis est additio intentionis totius super partem. Et quia veritas conclusionis istius sillogismi est certissima in anima et presens in memoria, quando
255 veniet propositio ad ipsum, recipit ipsam intellectus sine indigentia argumentationis iterande, sed per cognitionem tantum.

[3.34] Et omne quod est istius generis vocatur ab hominibus propositio prima. Et putatur quod comprehendetur solo
260 intellectu et quod non indigeatur in comprehensione veritatis circa ipsum nisi solo intellectu. Et causa illius est quod comprehenduntur statim.

[3.35] Sillogismi ergo quorum propositiones sunt universales et manifeste comprehenduntur in tempore insensibili.
265 Deinde quando sillogisatur multotiens, comprehendet ita quod veritas conclusionis confitetur vel certificetur in anima; tunc efficietur conclusio quasi propositio manifesta. Et secundum hunc modum erit comprehensio virtutis distinctive ad

239 sit maius *transp.* C1/post maius *add.* sua EP1P3R/et . . . nisi (240) *om.* P1/eius: huius propositionis EP3R 240 post maius *add.* sua EP3R; est: sit R; ergo *om.* S
242 post natura *add.* quod est Er 243 convenientie: convenientem S/ante maioris *scr.* et *del.* m S/post maioris *add.* et P1R/augmentatione (244): argumentatione P3; *corr.* ex argumentatione a. m. E 245 post totum *scr.* et *del.* et L3 246 aliud: alium EP3/maius: magis S/post maius *scr.* et *del.* pon P1 249 propositio *inter.* L3/sed comprehensio: ex comprehensione R; *corr.* ex ex comprehensione a. m. E 250 post distinctive *add.* sed comprehensio R/sua *om.* C1ErL3P3R/est² . . . rationem (251): per . . . est L3 253 et . . . particularis *om.* P1 256 propositio *om.* P1/post recipit *scr.* et *del.* iam Er 259 comprehendetur: comprehenduntur C1; comprehendatur EP3R/post solo *scr.* et *del.* intell P3 260 veritatis: virtutis P3 261 ipsum: ipsam L3/quod: quia C1Er 263 ergo *om.* P1 264 tempore: corpore P1 265 sillogisatur: sillogizantur EL3P3; sillogismus Er; *alter.* ex sillogismus in sillogizetur a. m. C1/multotiens: toties R/post multotiens *add.* et Er/comprehendet: comprehendetur C1Er/comprehendet ita *om.* R 266 quod *om.* P1; ut R; *corr.* ex iterum a. m. E/confitetur *corr.* ex refertur P3/confitetur vel *om.* R

270 plures intentiones que comprehenduntur ratione in tempore
insensibili sine indigentia argumentationis iterande.

[3.36] Et etiam multotiens non apparet qualitas comprehensionis intentionum visibilium que comprehenduntur ratione et cognitione, quoniam comprehensio earum erit valde velociter et quia comprehensio qualitatis comprehensionis non erit nisi
275 per secundum argumentum post primum argumentum per quod fuit visio. Virtus autem distinctiva non utitur isto argumento secundo in tempore in quo comprehendit aliquam intentionem visibilem, nec distinguit qualiter comprehendit illam intentionem, nec potest propter velocitatem comprehensionis
280 eius ad intentiones comprehensas per cognitionem et per argumentum cuius propositiones sunt manifeste et certe in anima. Et propter hoc non sentitur qualitas comprehensionis veritatis plurium propositionum verarum que comprehenduntur per cognitionem, et radix affirmationis veritatis earum est per rationem apud earum eventum. Quoniam quando iste propositiones
285 evenerint virtuti distinctivae, statim iudicat quod sint vere per cognitionem, sed apud cognitionem non inquirat qualiter affirmata fuerit prius veritas, nec inquirat qualiter comprehendit quod sunt vere apud eventum earum.

290 [3.37] Et etiam secundum argumentum per quod comprehendit virtus distinctiva qualitatem comprehensionis eius ad illud quod comprehendit non est argumentum in fine velocitatis, sed indiget consideratione. Quoniam comprehensiones
295 diversantur; et quedam sunt per naturam intellectus, et quedam per cognitionem, et quedam per considerationem et distinctionem. Comprehensio ergo qualitatis comprehensionis et que comprehensio eiusmodi comprehensionis est non est nisi per argumentum et distinctionem non velocem. Et propter hoc non apparet multotiens qualitas comprehensionis rerum visibilium
300 que comprehenduntur ratione apud comprehensionem.

269 tempore *corr. ex temporum a. m. C1* 272 comprehenduntur: comprehenduntur C1EErP3R 273 post comprehensio *scr. et del. est L3/post earum add. non C1EErL3P1P3RS/erit: sit R/erit valde: est EL3P3* 274 erit: est R 275 per secundum *mg. a. m. C1/per² om. EP3* 276 fuit *corr. ex fit EP3 (a. m. E)/argumento secundo (277) transp. EP3R* 280 eius *om. EP3* 283 plurium: plurimum S 286 evenerint: eveniunt EP3R; *corr. ex evenerunt L3/sint: sunt C1Er* 287 sed . . . cognitionem *inter. L3* 288 affirmata *corr. ex affirmativa C1/comprehendit . . . vere (289): sunt vere quod comprehendit P1S (sunt: sit P1)* 289 quod *rep. Er/sunt: sint EP3R/sunt vere transp. EL3P3R/earum om. P1* 290 secundum: pari modo R 291 ad . . . comprehendit (292): quod comprehendit ad illud S (quod comprehendit alter. *ex comprehendit quod*) 294 naturam: verum P3 296 qualitatis: qualitas S 297 eiusmodi *corr. ex eiusdem a. m. S* 298 argumentum *corr. ex distractionem a. m. E/post et¹ add. per Er* 300 que *inter. L3*

[3.38] Et etiam est homo natus ad distinguendum et ad arguendum sine difficultate et labore, et non percipit quod ipse arguit nisi quando arguit cum difficultate. Quando vero non utitur difficultate et cognitione, non percipit quod arguit. Argumenta ergo assueta quorum propositiones sunt manifeste et non indigent difficultate sunt in homine naturaliter, et propter hoc non percipit quando comprehendit conclusiones earum quod comprehendit ipsas per argumentum. Et significatio quod homo natus est ad arguendum, et quod ipse arguit et non percipit quod arguit, est quod apparet in pueris in primo cremo. Quoniam ipse comprehendit plures res sicut homo perfectus distinguens, et utitur multis operationibus per distinctionem. Verbi gratia quia puer, quando ei demonstrantur duo ex eodem genere, sicut duo poma, et fuerit unum pulcrius alio, accipiet pulcrius et dimittet alterum. Sed electio rei pulcrioris non est nisi per comparisonem alterius ad alterum. Et comprehensio pulcri quod sit pulcrum, et fedi quod sit fedum—et similiter, quando elegerit pulcrius alio pulcro minoris pulcritudinis—significat quod non elegit ipsum nisi post comparisonem unius ad alterum, et comprehensionem forme cuiuslibet illorum, et comprehensionem argumenti pulcritudinis pulcrioris super minus pulcrum. Et electio pulcrioris non est nisi per propositionem universalem dicentem quod est pulcrius est melius, et quod est melius est dignius ad eligendum. Ipse ergo utitur hac propositione, et non percipit quod utitur ea.

[3.39] Et cum ita est, puer ergo arguit et distinguit. Et non est dubium quod puer nescit quid sit argumentum, nec percipit, quando arguit, utrum arguat aut non. Et si quis etiam intenderet ipsum instruere quid esset arguere, non intelligeret.

1 natus: situs EP1P3; corr. ex situs a. m. C1Er; alter. ex situs in ordinatus L3S/et² . . . difficultate (2): sine . . . et ad arguendum EL3P3R/ad om. R 2 et¹: sine EL3P3R/ipse om. EL3P3R 3 vero: ratio EP3 4 cognitione corr. ex cognitionem P3 7 quando: quod C1Er/quando comprehendit om. P3/comprehendit . . . quod (8) scr. et del. C1/earum: eorum EP3R 8 comprehendit: comprehendat EP3R 9 ante quod¹ add. est EP3R (mg. a. m. E)/et¹ om. R 10 percipit: precipit S/est om. R/post primo scr. et del. in P1/cremento (11): incremento R 11 ipse comprehendit: ipsi comprehendunt EP3R 12 post perfectus add. et R/utitur: utuntur EP3R/post utitur scr. et del. mult P3 13 quia om. EP3R 14 ex rep. P3 15 accipiet: accipit C1Er/dimittet: dimittit C1Er 16 ad: ab Er 18 elegerit: eligerit Er; elegit P3 19 significat: scilicet C1EErL3P3/non om. Er/elegit: eligerit L3/nisi corr. ex natum L3/comparationem (20): comparisonum Er 21 illorum: eorum EL3P3R 22 pulcrioris: pulcriorioris S/per inter. L3 23 est pulcrius est melius (24): pulcrius est melius est C1EErL3P3R 24 est¹ om. L3/est melius transp. C1Er/est dignius transp. C1EEr/ipse ergo transp. EL3P3R 25 utitur²: utatur R 26 est: sit R/puer ergo transp. P1 27 quid: quod C1R/sit: est R 28 arguat: arguit L3/etiam corr. ex autem S 29 esset: sit argumentum vel EP3R

30 Et cum puer arguit et nescit quid est argumentum, anima ergo
humana est nata ad arguendum sine difficultate et labore, et
non percipit homo apud comprehensionem rei quod sit huius-
modi quod sit per argumentum. Sed intentiones que compre-
henduntur ratione non sunt nisi intentiones manifeste quarum
35 propositiones sunt valde manifeste; intentiones vero quarum
propositiones non sunt valde manifeste et quarum argumenta
indigent difficultate, quando comprehenduntur ab homine,
forte percipit quod comprehendit ipsas per rationem quando
fuerint ille vere distinctionis.

40 [3.40] Iam ergo declaratum est ex omni quod diximus quod
quedam intentiones que comprehenduntur per visum compre-
henduntur solo sensu, et quedam per cognitionem, et quedam
per distinctionem, et argumentum, et rationem, et positionem,
et quod qualitas comprehensionis intentionum particularium
45 per visum non apparet in maiori parte propter velocitatem
istius quod comprehenditur per cognitionem et propter veloci-
tatem argumenti per quod comprehenduntur intentiones visi-
biles, et quia virtus distinctiva est nata ad arguendum sine
labore et difficultate, sed natura et consuetudine.

50 [3.41] Et non indiget argumentatione iteranda illa virtus in
comprehensione alicuius intentionum particularium que multo-
tiens fuerint vise.

[3.42] Et comprehenduntur etiam intentiones que multoti-
ens fuerint vise ratione et distinctione que sunt in anima ita
55 quod homo non percipit quietem illarum; nec quies illarum
habet principium sensibile, quoniam habet ex pueritia quod
comprehendit visibilia, et ex pueritia est in eo quedam distinc-
tio, et precipue distinctio per quam comprehenduntur distinc-
tiones sensibiles. Ipse ergo comprehendit intentiones sensibiles

30 cum: quia R/est: sit L3P3RS/anima: non Er; corr. ex non a. m. C1 31 est nata
transp. EP3R 32 post homo add. quantum EP3 (quantum alter. ex quoniam P3)/
apud: ad EP3/post sit scr. et del. huma P1 34 quarum . . . manifeste (35) om. P1P3
35 valde manifeste transp. C1/intentiones vero om. P3 36 valde manifeste transp.
S/argumenta corr. ex argumentam S 38 quod corr. ex et a. m. C1 40 ergo:
vero L3 41 comprehenduntur om. P1 42 sensu corr. ex visu C1/et¹ . . .
distinctionem (43): et quedam per distinctionem et quedam per cognitionem EP3R
46 istius: illius C1Er; ipsius S 49 labore et difficultate: difficultate et labore L3
50 non om. P1 52 vise: in se Er 53 et . . . vise (54) mg. a. m. E/comprehenduntur
om. C1Er/etiam om. C1/etiam intentiones transp. Er/intentiones . . . vise (54) mg.
a. m. C1 54 fuerint: fiunt L3/vise: in se Er/post vise add. et comprehenduntur Er;
add. comprehenduntur C1 55 illarum²: earum L3 56 sensibile corr. ex visibile
P3/post quoniam add. homo C1Er/habet² om. Er; mg. a. m. C1/ex pueritia: experientia
R/quod om. Er; inter. a. m. C1 57 comprehendit: comprehendat sensibilia EP3/post
visibilia scr. et del. et alia E/ex pueritia: experientia R/est: inest EP3 58 distinctiones
(59): intentiones EP3R 59 sensibiles¹ om. P3

- 60 ratione et distinctione, et acquirit cognitionem intentionum
sensibilem, et multotiens reduntur ipse intentiones sensibiles
illi successive quousque quiescant in eius anima ita etiam quod
non percipit quietem earum. Et sic, quando venerit ipsa inten-
tio particularis que quievit in anima eius, comprehendet etiam
65 apud eius eventum per cognitionem. Et cum hoc non percipit
qualitatem comprehensionis, nec qualitatem cognitionis, nec
qualiter quieverit cognitio ipsius intentionis in anima eius. Om-
nes ergo intentiones particulares que comprehenduntur ratione
et distinctione et multotiens reduntur iam comprehensa sunt
70 ab homine in preterito tempore, et quieverunt in anima, et fac-
ta est forma universalis quiescens ex qualibet intentione par-
ticularium. Comprehenduntur ergo iste intentiones sine aliqua
argumentatione iteranda quam primo fecit, et sine ratione per
quam comprehensa fuit veritas illius intentionis, et sine com-
75 prehensione qualitatis comprehensionis ipsius apud compre-
hensionem, et sine prehensione qualitatis cognitionis apud
comprehensionem. Et nichil remanet indigens argumentatione
iteranda nisi intentiones particulares que sunt in individuis
particularibus, sicut figura in re individua (scilicet in re visa
80 signata), aut situs rei vise individue, aut magnitudo rei vise
individue, aut comparatio coloris alicuius rei vise individue
cum colore alterius rei vise, et sibi similis. Et secundum istos
modos erit comprehensio omnium intentionum particularium
que sunt in rebus visibilibus.
- 85 [3.43] Et cum declarata sint omnia ista, incipiemus modo
ad declarandum qualitates comprehensionis cuiuslibet intenti-
onum particularium que comprehenduntur per visum et quali-

60 cognitionem: intentionem *P1*; intentiones *R*/cognitionem intentionum *corr. ex*
intentionem sensibilem *a. m. S*/intentionum *om. P1R* 61 reduntur: reducantur *P3*;
corr. ex reducantur *a. m. E* 62 post etiam *add. et EL3P3*/quod: ut *R* 63 percipit:
percipiat *R*/ipsa intentio (64) *transp. C1Er* 64 quievit: quieverit *R*/etiam: eam *R*
65 eius eventum *transp. L3*; *corr. ex* eventum eius *P3*/et cum hoc: nec tamen *R*/non
om. EP3R 66 nec... cognitionis *om. P1S* 67 qualiter *inter. L3*/post qualiter *add.*
vel donec *a. m. S*; *add. donec EP1 (scr. et del. E)*/cognitio... eius: in anima eius cognitio
ipsius intentionis *EP3R* 69 et² *inter. L3*/reduntur: reducantur *P3*; *corr. ex* reducantur
a. m. E 70 quieverunt: quieverit *L3*/facta... forma (71): faciunt formam *P1S*
71 quiescens: quiescere *P1S* 72 iste intentiones *transp. EL3P3R*/aliqua *om. EL3P3R*
73 argumentatione *corr. ex* intentione *S*/primo fecit *transp. C1Er* 74 fuit: est *R*/
intentionis *corr. ex* intentiones *L3* 76 cognitionis *corr. ex* comprehensionis *Er*
77 indigens... iteranda (78): argumentatione... indigens *EP3R* 78 post nisi *add.*
considerare *EP3R*/post in *add. ipsis EP3R* 79 sicut *corr. ex* si *a. m. E*/scilicet *om.*
C1P1; *inter. ErL3 (a. m. Er)*/visa *rep. P1* 81 post aut *scr. et del. compara P3*/comparatio
corr. ex comparationis *S*/coloris alicuius *transp. C1Er*/individue... vise (82) *om. S*
82 sibi: illi *R* 83 comprehensio: corpore hensio *Er* 85 et: at *EP3*/sint *om. P3*/
modo *om. P1*

tates argumentationum per que acquirit virtus distinctiva intentiones comprehensas sensu visus.

- 90 [3.44] Intentiones particulares que comprehenduntur visu sunt multe, sed generaliter dividuntur in 22, et sunt: lux, color, remotio, situs, corporeitas, figura, magnitudo, continuatio, discretio vel separatio, numerus, motus, quies, asperitas, lenitas, diafonitas; item, spissitudo, umbra, obscuritas, pulcritudo, 95 turpitudine, et consimilitudo et diversitas in omnibus intentionibus particularibus et in omnibus formis compositis ex intentionibus particularibus. Ista sunt ergo omnia que comprehenduntur per sensum visus. Et si aliqua intentio visibilis est preter istas, collocabitur sub aliqua istarum: sicut ordinatio, que 100 collocabitur sub situ; et scriptura et pictura, que collocantur sub figura et ordinatione; et sicut rectitudo, et curvitas, et concavitas, et convexio, que collocantur sub figura; et multitudo et paucitas, que collocantur in numero; et sicut equalitas et augmentum, que collocantur sub similitudine et diversitate; et 105 alacritas, et risus, et tristitia, que comprehenduntur ex figura forme faciei (collocantur ergo sub figura); et sicut fletus, qui comprehenditur ex figura faciei cum motu lacrimarum (collocatur ergo sub figura et motu); et sicut humiditas et siccitas que collocantur sub motu et quiete, quoniam humiditas comprehenditur sensu visu, sed non sensu visu comprehenditur 110 nisi ex liquiditate corporis humidi et ex motu unius partis illius ante aliam, et siccitas comprehenditur visu, sed non comprehenditur visu nisi ex retentione partium corporis sicci et ex privatione motus liquiditatis. Et similiter quilibet intentio 115 particularis comprehensa a visu collocatur sub partibus quas prediximus, et omnes intentiones visibiles sunt sicut superius

88 argumentationum: argumentorum R 89 visus: visu C1ErL3S 90 ante visu add. sensu EP3R 91 post lux add. et C1Er 92 continuatio: continuum EP3R 93 vel: et R/numerus corr. ex numerum C1/post motus add. et EP3/post asperitas add. et EP3 94 item om. C1ErR/obscuritas corr. ex obscura L3/post pulcritudo scr. et del. pul Er 95 et¹ om. R/intentionibus (96) corr. ex intentione a. m. S 96 particularibus: partibus S/compositis: positus Er; corr. ex positus a. m. C1/post ex add. omnibus EP3R 97 sunt ergo transp. EL3P3R 98 visibilis est transp. C1Er 100 que om. L3/collocantur: collocabuntur EL3P3R 101 ordinatione: ordine EP3R/rectitudo corr. ex reti a. m. P3/rectitudo et om. L3 102 convexio: convexitas R/post figura rep. et¹ (101) . . . figura (102) Er; scr. et del. sicut (101) . . . figura (102) C1 103 collocantur: collocatur ErP1; colligitur L3/in: sub EP3R 104 collocantur: collocatur P1/similitudine: consimilitudine C1EP3; alter. in consimilitudine Er/post diversitate scr. et del. eius P3 106 sicut corr. ex situs P1 107 comprehenditur: continetur EP3/ex: sub P3R/faciei corr. ex forme S 110 visu^{1,2}: visus P1 112 post comprehenditur add. sensu EL3P3R (inter. L3)/visu: visus EL3P3R 113 visu om. EL3P3R/retentione: intentione P1 114 intentio corr. ex intentione L3 115 sub partibus rep. P1 116 prediximus: diximus prius EP3R/sunt mg. a. m. C1; inter. a. m. Er

diximus.

[3.45] Et cum ita est, distinctio et argumentatio virtutis
distinctive, et cognitio formarum et signorum eorum, non erunt
120 nisi ex distinctione virtutis distinctive ex formis pervenientibus
intra concavum nervi communis apud comprehensiones ultimi
sentientis illas et ex cognitione signorum formarum istarum.

[3.46] Et etiam corpus sentiens extensum a superficie
membri sentientis usque ad concavum nervi communis—scilicet
125 spiritus visibilis—est sentiens per totum, quoniam virtus sensi-
tiva est per totum istius corporis. Cum ergo extenditur forma
a superficie membri sentientis usque ad concavum nervi com-
munis, quolibet pars corporis sentientis sentiet formam. Et
cum pervenerit forma in concavum nervi communis, compre-
130 hendetur ab ultimo sentiente, et tunc erit distinctio et argu-
mentatio. Virtus ergo sensitiva sentit formam rei vise ex toto
corpore sentiente extensa a superficie membri sentientis usque
ad concavum nervi communis, et virtus distinctiva distinguit
intentiones que sunt in forma apud comprehensionem ultimi
135 sentientis circa formam. Secundum ergo hunc modum erit
comprehensio formarum rerum visibilium a virtute sensitiva, et
ab ultimo sentiente, et a virtute distinctiva. Et declarabitur ex
ista dispositione quod virtus sensitiva sentit locum membri
sentientis in quo pervenit forma, quoniam non sentit formam
140 nisi ex loco in quo pervenit forma.

[3.47] Et etiam declaratum est in capitulo precedenti quod
a quolibet puncto superficiei glacialis extenditur forma secun-
dum unam verticationem continuam cum eo quod est in ea de
obliquatione et incurvatione quousque perveniat ad unum
145 punctum loci in quod pervenit forma in concavo nervi commu-
nis. Et cum ita est, forma ergo perveniens in parte superficiei
glacialis extenditur ab illa parte ad aliam partem concavi nervi
communis. Et vise res diverse que comprehenduntur simul in

118 est: sit R; inter. a. m. S 120 post ex¹ add. cognitio vel EP3R 121 com-
prehensiones: comprehensionem R 122 formarum istarum transp. C1Er
123 etiam: ita R 124 scilicet . . . communis (127/128) mg. a. m. E/post scilicet scr. et
del. pus C1 126 extenditur forma transp. R 127 usque corr. ex sed a. m. S
128 ante quolibet scr. et del. et E/post pars scr. et del. s P1 130 ab corr. ex ad Er
131 ergo: autem EL3P3R/sentit corr. ex senti P3/formam: forma S 132 extensa:
extensam P1RS 133 nervi communis transp. C1Er 135 erit: est C1/erit
comprehensio (136) rep. P1 137 a om. P1 139 quoniam . . . forma (140) mg.
a. m. E; inter. L3 140 quo: quem R 141 etiam om. EL3P3/etiam . . . est: declara-
tum est etiam R/in . . . precedenti om. R 143 est om. ES/ea: eadem ER; eodem P3/
de inter. a. m. E 145 quod: quo L3; quem R 146 est: sit R/parte: partem R
148 post et add. forme cuiuslibet R/vise res diverse: visarum rerum diversarum R

eodem tempore extenditur forma cuiuslibet illarum ad locum
 150 certum concavi nervi communis, et perveniunt forme omnium
 illarum rerum visarum ad concavum nervi communis, et erit
 ordinatio formarum illarum adinvicem in concavo nervi com-
 munis sicut ordinatio ipsarum rerum visarum adinvicem. Cum
 ergo fuerit visus oppositus alicui rei vise, forma lucis et coloris
 155 illius rei vise pervenit in superficie visus et in superficie glacia-
 lis, et extenditur super verticationes determinatas quas dixi-
 mus secundum suam ordinationem, et figuram, et formam
 quousque perveniat ad concavum nervi communis. Et compre-
 hendetur a virtute sensitiva apud proventum eius in corpore
 160 glacialis et apud proventum eius in toto corpore sentiente.
 Deinde apud proventum eius in concavo nervi communis com-
 prehenditur ab ultimo sentiente, et virtus distinctiva distinguit
 omnes intentiones que sunt in ea. Et forma coloris et forma
 lucis non perveniunt ad concavum nervi nisi quia corpus senti-
 165 ens extensum in concavo nervi coloratur a forma lucis et col-
 oris, et illuminatur a forma lucis. Et pervenit forma ad con-
 cavum nervi communis, et erit pars corporis sentientis quod
 est in concavo nervi communis ad quem pervenit forma rei vise
 colorata colore illius rei vise et illuminata luce que est in illa re
 170 visa. Et si res visa habuerit unum colorem, erit illa pars cor-
 poris sentientis unius coloris, et si partes rei vise fuerint diversi
 coloris, erunt partes illius partis corporis sentientis quod est in
 concavo nervi communis diversi coloris. Et ultimum sentiens
 comprehendit colorem rei vise ex coloratione quam invenit in
 175 illa parte, et comprehendit lucem rei vise ex illuminatione
 quam invenit in illa parte. Et virtus distinctiva comprehendit

149 forma . . . illarum *om.* R/illarum: earum EP3 150 certum *om.* S/concavi: in con-
 cavo R 152 adinvicem: inter se R 153 rerum visarum *om.* P1/rerum . . . adin-
 vicem: adinvicem . . . visarum P3/visarum adinvicem *transp.* ER/adinvicem: inter se R
 154 post ergo *scr. et del.* rerum P1/fuerit visus *transp.* R/et . . . illius (155) *rep.* P1
 155 illius: istius EP3R/pervenit: perveniunt C1EErL3P3RS/in¹: ad R/superficie¹:
 superficiem EP3R/post et *add.* perveniunt EL3P3R (*alter. ex* pervenerint a. m. E)/super-
 ficie²: superficiem R 156 extenditur: extenduntur P1RS/super: secundum R
 158 perveniat: perveniant P1RS/comprehendetur (159): comprehenduntur R
 159 a *om.* S/post sensitiva *scr. et del.* i Er/proventum: perventum EL3P3R; *corr.* ex
 perventum S/eius: earum R 160 proventum: perventum P3R/eius: earum R/toto
om. S/toto corpore *transp.* P1 161 deinde . . . proventum *om.* Er; deinde . . . sentiente
 (162) *om.* R/proventum: perventum P3/in . . . comprehenditur (162): comprehenditur
 in concavo nervi communis EL3P3S/comprehenditur (162): comprehenditur C1EErL3P3
 163 ea: eis R/forma . . . lucis (164): forma lucis et forma coloris R/forma² *om.* P1S
 165 coloratur *inter.* L3 166 forma² *om.* P1S 167 pars *mg.* a. m. Er 168 quem:
 quam RS 169 post illuminata *add.* a L3 170 habuerit *corr.* ex fuerit S/post
 habuerit *scr. et del.* rem P3/unum colorem *transp.* P3 171 sentientis *om.* P1
 172 illius *corr.* ex istius P3/partis *om.* P1S/partis corporis *transp.* EP3R 173 et *corr.*
 ex ad S 174 comprehendit: sentit EP3R 175 et . . . parte (176) *mg.* a. m. S

plures intentiones particulares que sunt in re visa ex distincti-
one intentionum que sunt in illa forma ab ea—scilicet ex ordi-
natione partium forme, et ex figuratione illius quod continet
180 formam, et ex figuratione partium eius, et diversitate colorum,
et situum, et ordinationum que sunt in partibus illius forme, et
ex consimilitudine et diversitate earum.

[3.48] Et etiam lux veniens a re visa colorata ad visum non
venit per se sine colore, et forma coloris veniens a re visa col-
185 orata ad visum non venit sine luce sola, et non venit forma
lucis et coloris que sunt in re visa nisi admixte, nec
comprehendit eas ultimum sentiens nisi admixtas. Tamen cum
hoc sentiens comprehendit rem visam illuminatam, et
comprehendit quod lux apparens in re vise est diversa a
190 colore, et ista comprehensio est distinctio. Distinctio autem
non est nisi virtutis distinctive, non sensitive. Tamen cum
comprehensione istius intentionis a virtute distinctiva, ista
intentio quiescit in anima, et non indiget argumentatione
iteranda apud eventum cuiuslibet forme, sed quiescit in anima.
195 Sed quod lux que est in ea est diversa a colore qui est in ea et
comprehensio virtutis distinctive quod lux accidentalis que est
in re visa colorata est diversa a colore qui est in ea est quia
super unam rem visam diversatur lux, et aliquando
augmentatur, et aliquando diminuitur. Et cum hoc est,
200 remanet color eius idem; quamvis diversetur scintillatio coloris
secudum diversitatem lucis, tamen genus coloris non
diversatur. Et etiam lux accidentalis forte pervenit ad rem
visam ex foramine, et cum fuerit opilatum illud foramen,
obscurabitur illa res visa. Ex comprehensione ergo virtutis
205 distinctive circa diversitatem lucis super res visas, et ex
comprehensione eius circa illuminationem rei vise aliquando et
privationem lucis ab ea aliquando comprehendit quod colores
qui sunt in rebus visis sunt diversi a luce que accidit in eis.
Forma ergo quam comprehendit sentiens ex re visa colorata est

177 *visa corr. ex vise P3* 178 *ex: ab EP3* 179 *ex om. L3/illius . . . figuratione (180)*
om. P1S 180 *ex om. Er/diversitate corr. ex distinctione EP3 (a. m. E)* 181 *illius*
forme inter. L3/forme om. P1 182 *post ex scr. et del. dis P1/consimilitudine corr. ex*
consuetudine P3 183 *non . . . visum (185) mg. a. m. S* 185 *sine luce sola: sola*
sine luce C1Er 187 *eas . . . comprehendit (188) mg. a. m. S/cum hoc (188): etiam R*
191 *post non² scr. et del. sentisi P3/cum inter. S* 192 *intentionis: intentione Er; corr.*
ex distinctionis E 194 *sed . . . anima om. R* 195 *post lux scr. et del. acciden-*
talis S 197 *ante re add. ea P1S/a inter. a. m. C1* 199 *augmentatur corr. ex*
argumentatur S 200 *post quamvis scr. et del. enim C1Er/scintillatio corr. ex sintil-*
latio S 202 *forte: forme Er* 203 *opilatum: obstructum R* 205 *super:*
supra EP3 206 *eius inter. L3/et: etiam R* 207 *post ab scr. et del. a Er/aliquando*
om. R/ante quod add. visus R 208 *in² om. P1S*

210 forma admixta ex forma lucis et coloris que sunt in re visa, et
virtus distinctiva comprehendit quod color qui est in eo est
diversus a luce que est in ea. Et ista comprehensio est
comprehensio secundum cognitionem apud eventum forme in
sentienti, quoniam iam quiescunt in anima quod lux cuiuslibet
215 forme admixte ex luce et colore est diversa a colore qui est in
ea.

[3.49] Et primum quod comprehendit virtus distinctiva ex
intentionibus que appropriantur forme est quiditas coloris.
Quiditas autem coloris non comprehendetur a virtute distinc-
220 tiva nisi per cognitionem quando color rei vise fuerit ex colori-
bus assuetis, et comprehensio quiditatis coloris a virtute dis-
tinctiva secundum cognitionem non est nisi ex comparatione
forme coloris ad formas quas comprehendebat ante, ex formis
scilicet similibus illi colori. Quoniam visus, quando compre-
225 henderit colorem rubeum, et comprehendit quod sit rubeus,
non comprehendet quod sit rubeus nisi quia cognoscit ipsum,
et ista cognitio non est nisi ex assimilatione eius ad res quas
comprehendebat prius. Si autem visus nunquam comprehen-
disset rubeum colorem nisi modo, nesciret apud comprehensi-
230 onem rubei quod sit rubeus. Cum ergo color fuerit ex coloribus
assuetis, cognoscetur a visu secundum cognitionem, et si fuerit
ex coloribus extraneis ita quod visus nunquam comprehenderit
talem ante, non comprehendetur a visu ut cognoscat ipsum;
sed assimilabit ipsum coloribus propinquis illis, scilicet quos
235 cognoscebat. Radix ergo comprehensionis coloris est solo sen-
su; deinde quando multotiens redierit super visum, compre-
hendetur per cognitionem, scilicet cuiusmodi fuerit coloris.

[3.50] Et quiditas lucis etiam non comprehendetur a visu
nisi per cognitionem, quoniam visus cognoscit lumen solis et

210 *post et¹ add. forma C1ErL3P3R/visa inter. a. m. C1* 212 *est comprehensio (213)*
om. P1 213 *comprehensio om. C1Er/post forme add. que est EP3R* 214 *qui-*
escunt: quiescit R 219 *comprehendetur: comprehenditur P1; corr. ex*
comprehenduntur P3 221 *a . . . distinctiva (222) mg. a. m. S* 224 *visus quando*
transp. R/quando corr. ex non P3/comprehenderit (225): comprehendit P1R
225 *comprehendit: comprehendet EL3P3; comprehenderit C1Er* 226 *comprehend-*
it comprehendit P1RS 227 *non om. P3/ante eius add. forme C1ErL3P3R/post ad add.*
illas P1S 229 *rubeum colorem transp. P1S* 230 *post rubei scr. et del. et Er/sit:*
esset R/color fuerit corr. ex fuerit color Er 231 *post secundum scr. et del. n C1*
233 *talem: tale P1S/non inter. L3* 234 *ipsum: propter Er/illis om. EP3R/scilicet*
quos transp. C1Er 235 *post est add. a EL3P3R/solo sensu (236) transp. EP3R*
236 *post quando add. super visum EP3R (mg. a. m. E)/super visum om. EP3R/*
comprehendetur per cognitionem (237): per . . . comprehendetur EP3R 237 *scilicet*
cuiusmodi transp. L3 239 *post cognitionem scr. et del. o C1/post cognoscit add.*
lumen ignis et EP3R; add. lumen visus ignis et L3

240 distinguit inter ipsum et lucem lune et ignis, et sic cognoscit
lucem lune et lucem ignis. Comprehensio ergo quiditatis cuius-
libet istarum lucium a visu non est nisi per cognitionem.

[3.52] Deinde omne quod comprehenditur per sensum vi-
sus post lucem et colorem non comprehendetur solo sensu, sed
245 comprehendetur per distinctionem et argumentationem cum
sensu. Quoniam omne quod comprehenditur per distinctionem
et argumentationem non comprehendetur nisi ex distinctione
intentionum que sunt in forma sensibili, et similiter omne quod
comprehenditur per cognitionem non comprehenditur nisi ex
250 comprehensione signorum que sunt in forma sensibili. Et in-
tentiones que comprehenduntur per distinctionem, et argumen-
tationem, et cognitionem non comprehenduntur nisi cum sensu
forme. Lux autem que est in corpore illuminato per se compre-
henditur a visu secundum suum esse, et per se, et ex ipso sen-
255 su; et lux et color que sunt in corpore colorato illuminato lumi-
ne accidentali comprehenduntur a visu in simul et admixta, et
solo sensu. Lux ergo essentialis comprehenditur a sentiente ex
illuminatione corporis sentientis, et color comprehenditur a
sentiente ex alteratione corporis sentientis et eius coloratione.
260 Et cum huiusmodi comprehensione lucis a corpore sentienti per
lumen accidentale admixtum cum illo colore sentiens ergo com-
prehendit ex corpore apud perventum forme coloris ad ipsum
lucem coloratam, et comprehendit ex eo apud perventum for-
me lucis essentialis in eo lucem solam. Ista ergo duo tantum
265 comprehenduntur a visu solo sensu.

[3.53] Et etiam dicemus quod comprehensio coloris in eo
quod est color est ante comprehensionem quiditatis coloris:
scilicet quod visus comprehendit colorem et sentit quod est
color antequam sentiat cuiusmodi sit coloris. Quoniam apud

240 et¹ om. EP3R/lucem: lumen C1ErP3R/lucem lune corr. ex lumen lucerne a. m. E/ lunc: lucerne P3/post et² add. lumen C1Er 241 lucem² om. P1S/post quiditatis scr. et del. i P3/cuiuslibet (242) om. EP3R 244 comprehendetur: comprehenditur R 245 comprehendetur: comprehenditur R 247 argumentationem corr. ex argumentationi S/comprehendetur: comprehenditur C1ErR 248 et . . . sensibili (250) om. R 249 comprehenditur^{1,2}: comprehenditur L3/ante non scr. et del. quod Er/non comprehenditur transp. Er/ante nisi add. quidem P1S 251 argumentationem corr. ex argutionem (252) a. m. S 256 comprehenduntur: comprehenduntur C1Er/ in om. R 258 post et scr. et del. eius S/comprehenditur: comprehenditur L3/post a scr. et del. sentie P3 259 post alteratione add. forme EL3P1P3R (mg. a. m. E)/post corporis add. forme C1Er (scr. et del. C1) 260 sentienti: sentiente R 261 colore: corpore EP3 262 ipsum: ipsam C1EErP3; se R 263 post et add. sic P1/ex: cum P3 264 in eo om. R/solam corr. ex sole P3/ista corr. ex ita S 266 etiam: iterum R 267 coloris om. P3 268 comprehendit om. P3/post comprehendit add. quiditatem EP3/colorem: coloris EP3 269 cuiusmodi: cuius L3/post sit add. cor- poris vel EP3

270 perventum forme in visu coloratur visus, et cum coloratur visus, sentit quod sit coloratus, et sic sentit colorem. Deinde ex distinctione coloris et comparatione ipsius ad colores notos visui comprehendit quiditatem coloris. Comprehensio ergo coloris in eo quod est color erit ante comprehensionem quiditatis coloris, et erit comprehensio quiditatis coloris per cognitionem. Et significatio quod visus comprehendit colorem in eo quod est color antequam comprehendat cuiusmodi sit ratio coloris est quia visibilia quorum colores sunt fortes, sicut viriditas profunda, et fuscitas, et sibi similia, quando fuerint in loco obscuro non valde, non comprehenduntur a visu in illo loco nisi quasi color tantum. Tamen sentit quod sint colores, et non distinguit cuiusmodi sint colores in principio comprehensionis. Et quando locus non fuerit valde obscurus, et fuerit visus multum intuens, comprehendet cuiusmodi sint coloris, aut si lux augmentetur et intendatur in illo loco. Declarabitur ergo ex ista experimentatione quod visus comprehendit colorem in eo quod est color antequam comprehendat cuiusmodi sit coloris.

[3.54] Et illud quod comprehendit visus ex colore in principio sui proventus ad visum est coloratio, et coloratio est quasi obscuritas aut umbra quando color fuerit subtilis. Et si res visa fuerit diversorum colorum, comprehendet visus in principio ex forma illius rei vise obscuritatem partium diverse qualitatis secundum fortitudinem et debilitatem, aut quasi umbras diversas in fortitudine et debilitate. Primum ergo quod comprehendit visus ex forma coloris est mutatio membri sentientis et coloratio eius que est obscuritas, aut similitudo obscuritati. Deinde sentiens distinguet illam colorationem. Et si res visa fue-

270 perventum: proventum *P1S/visus*¹ *om.* *P1/et . . . visus* (271) *mg.* *L3/coloratur visus* (271) *transp.* *EP3R* (*visus inter. a. m. E*) 271 sentit¹ *corr.* *ex sentiens L3*
 273 comprehensio . . . coloris¹ (275) *mg.* *L3* 274 erit: est *EP3R* 275 et . . . coloris
om. *C1; inter. a. m. S/ante per inter. que est a. m. C1* 276 ante et *scr. et del.* si ergo *P3/*
colorem: colore Er 277 comprehendat *alter. in* comprehendit *P1/post* comprehendat
scr. et del. co *P1/post* sit *scr. et del.* id *C1/ratio: id EEerL3P3; om.* *C1* 278 quorum *corr.*
ex cuiusmodi EP3 (a. m. E) 279 sibi *om.* *R/similia: similes R; corr. ex consimilia P1*
 280 loco obscuro *transp.* *P1R/post* loco *add.* valde *R/post* obscuro *scr. et del.* non *P1/non*
valde om. *R/post* illo *scr. et del.* co *C1* 281 color: colores *R/post* color *add.* obscurus
C1Er; add. colorata P3/tantum om. *P3/sint corr. ex sentit L3* 282 post non *scr. et del.*
di L3/colores mg. a. m. E 283 fuerit² *om.* *R* 284 multum *corr. ex tantum a. m. E/*
intuens: intueatur R/comprehendet: comprehendit EL3P3RS/post comprehendet *add.*
visus EP3R/sint: sunt P1S/coloris: colores L3; corr. ex colores EP3 285 aut: ante *S/*
intendatur corr. ex intendetur P1 286 comprehendit: comprehendet *C1Er*
 287 est *om.* *EP3/comprehendat: comprehendit S* 290 proventus: perventus *R*
 291 fuerit *om.* *P1* 295 debilitate: debilitatem *P1* 297 obscuritati: obscuri-
 tatis *EP3R*

rit illuminata, distinguetur ille color a visu et comprehendetur
 300 eius quiditas quando fuerit ex coloribus quos multotiens com-
 prehendebat. Et si fuerit ex coloribus quos fere semper com-
 prehendebat, comprehendetur in minimo tempore, et in instan-
 ti secundo inter quod et primum in quo comprehendit colorem
 in quantum est color non est sensibile tempus. Si autem fuerit
 5 ex coloribus non manifestis quos visus non comprehendit ante
 nisi raro, aut fuerit in loco obscuro debilis lucis, non compre-
 hendetur a visu quiditas eius nisi in tempore sensibili. Et si res
 visa fuerit obscura, et non fuerit in ea nisi modica lux, sicut
 illud quod comprehenditur nocte et in locis valde obscuris, non
 10 distinguetur a sentiente ex ea nisi obscuritas tantum. Declara-
 tum est ergo ex comprehensione colorum in locis obscuris quod
 comprehensio coloris in eo quod est color est ante comprehen-
 sionem quiditatis eius.

[3.55] Et significatio etiam quod visus comprehendit color-
 15 em in eo quod est color antequam comprehendat cuiusmodi sit
 coloris est quia visus, cum comprehenderit colorem extraneum
 quem nunquam vidit ante, comprehendet quod est color, et
 cum hoc nesciet cuiusmodi sit coloris. Et cum fuerit multum
 circa ipsum, assimilabit ipsum propinquiori colori simili ipsi.

20 [3.56] Ex istis ergo experimentationibus declaratur declar-
 atione manifesta quod comprehensio coloris in eo quod est
 color erit ante comprehensionem quiditatis coloris. Et declar-
 atum est etiam ex istis experimentationibus quod comprehen-
 sio quiditatis coloris non erit nisi per distinctionem. Illud ergo
 25 quod comprehendit visus solo sensu non est nisi color in eo
 quod est color, et lux in eo quod lux, et preter ista non com-
 prehendit solo sensu nisi per distinctionem, et argumentatio-
 nem, et cognitionem.

1 ante et add. prius EP3R/post quos scr. et del. multotiens Er/post semper add. ante EP3R
 2 minimo: minori P3; minore R; corr. ex minori a. m. E 3 post inter scr. et del. et P1/
 post primum scr. et del. aut L3 4 in quantum: quatenus R/tempus corr. ex tem-
 poris S 5 non² inter. L3/comprehendit: comprehendidit Er 6 post obscuro add.
 et R 8 non om. R 9 post quod add. sicut P3/ante nocte scr. et del. quia E/nocte
 corr. ex recte P1/nocte et inter. a. m. E/valde obscuris transp. P3 10 distinguetur a
 sentiente: sentietur a distinguente EP3/ex ea inter. a. m. E; om. R/declaratum (11):
 determinatum EP3 14 significatio etiam transp. R/etiam om. Er/comprehendit
 corr. ex comprehenditur L3 15 ante in scr. et del. extraneum S 16 comprehenderit:
 comprehendit P1RS 17 vidit: viderit EP3/comprehendet: comprehendit RS
 18 cum hoc nesciet: tamen nescit R/nesciet: nesciret P1S; corr. ex nescit a. m. E
 19 post ipsum² add. et Er/ipsi: sibi EP3; illi R 20 declaratur: determinatur EP3
 21 comprehensio corr. ex comprehensione P3 22 erit: erat Er 23 etiam om. P1S
 25 eo inter. a. m. Er 26 est om. L3S/post et¹ scr. et del. in S/post quod² add. est C1ErR/
 non: nihil R 27 nisi: sed R 28 et cognitionem om. Er

[3.57] Et etiam dicamus quod comprehensio quiditatis
 30 coloris non est nisi in tempore, quoniam comprehensio quidi-
 tatis coloris non est nisi per distinctionem et assimilationem.
 Sed distinctio non est nisi in tempore; ergo comprehensio
 quiditatis coloris non est nisi in tempore. Significatio autem
 manifesta quod comprehensio quiditatis coloris non est nisi in
 35 tempore est illud quod apparet in troco apud motum eius,
 quoniam quando in troco fuerint tincture diverse, et ille tinc-
 ture fuerint lineae extense ex medio superficiei eius manifeste et
 ex parte colli eius usque ad finem sue circumferentie, quoniam
 quando trocus fuerit circumgiratus motu forti, et aspexerit
 40 ipsum quis, comprehendet omnes eius colores quasi unum
 diversum ab omnibus coloribus qui sunt in eo, quasi esset color
 compositus ex omnibus coloribus illarum linearum. Et non
 comprehendet lineationem nec diversitatem colorum. Et cum
 hoc comprehendet ipsum quasi quietum quando motus eius
 45 fuerit valde fortis, quoniam quodlibet punctum non figitur in
 eodem loco tempore sensibili, sed in quam minimo tempore
 girat circumferentiam totam super quam revolvitur. Pervenit
 ergo forma puncti in visu super circumferentiam circuli in visu,
 et visus non comprehendit colorem illius puncti in minimo tem-
 50 pore nisi ex tota circumferentia circuli pervenientis in visu.
 Comprehendit ergo colorem illius puncti in minimo tempore
 circumgiratum. Et similiter omnia puncta que sunt in super-
 ficie troci; scilicet quod visus comprehendit colorem cuiuslibet
 illorum super totam circumferentiam circuli super quam move-
 55 tur ille punctus in minimo tempore, et omnia puncta quorum
 remotio a centro est equalis moventur apud circumgirationem
 troci super eandem circuli unius circumferentiam. Et accidit
 ergo ex hoc ut appareat color cuiuslibet puncti illorum punc-

29 etiam *inter. S/post comprehensio scr. et del. quid Er* 30 nisi *inter. a. m. P1/post*
 quoniam *add. enim R* 31 coloris *om. P1S* 33 coloris *om. L3/post tempore scr. et*
del. est illud S/significatio: significationem R 34 manifesta: manifestam *R*
 35 est: praebet *R/troco corr. ex toto P3* 36 quando *inter. L3/post troco add. quan-*
do L3 37 lineae: sine *Er; corr. ex sine a. m. C1* 38 sue circumferentie *transp. P1/*
quoniam om. R 39 quando: et *R* 40 ipsum quis *transp. C1Er/eius colores transp.*
EP3R/post eius scr. et del. prord S 41 post omnibus *scr. et del. eius C1/post coloribus*
add. eius EP3R 42 ex: ab *C1Er/coloribus: colorum Er; corr. ex colorum L3*
 43 post comprehendet *add. illam P1S/cum hoc (44): simul R* 44 hoc *om. P3*
 46 quam: quantum *EP3R* 47 circumferentiam totam *transp. C1Er* 48 visu!:
 visum *R* 49 puncti *corr. ex visi E* 50 visu: visum *EP3R* 51 comprehendit:
 comprehendet *Er/in inter. L3/post in scr. et del. mino P3* 53 scilicet: significant *R*
 54 quam: quem *C1Er* 55 ille: illius *L3P3; illud R; corr. ex illius a. m. E/punctus:*
 punctum *R/omnia: omni et C1* 56 centro: puncto *EP3/moventur: movetur P1*
 57 troci *mg. a. m. C1/post circuli scr. et del. super eandem P1/et om. R* 58 illorum
corr. ex eorum Er

- torum quorum remotio a centro est equalis super circumferen-
 60 tiam eiusdem circuli in minimo tempore quod erit tempus revo-
 lutionis, quare apparebunt colores omnium punctorum in tota
 circumferentia illius circuli admixti. Et propter hoc compre-
 henditur color superficiei troci quasi unus color admixtus ex
 omnibus coloribus qui sunt in sua superficie.
- 65 [3.58] Si ergo visus comprehendisset quiditatem coloris in
 uno instanti, et non indiguisset ad comprehendendum quidi-
 tatem eius tempore, comprehendisset in uno instanti et in quo-
 libet instantium temporis in quo movetur trocus quiditates
 omnium colorum qui sunt in troco distincti apud motum.
- 70 Quoniam si non indiguerit tempore ad comprehendendum
 quiditates eorum, comprehendet illos in parte temporis revolu-
 tionis et in quolibet instantium temporis revolutionis apud
 motum eorum sicut comprehendet quiditatem eorum apud
 eorum quietem, quoniam quiditas omnium colorum visibilium
 75 assuetorum in quiete et in motu sunt uniusmodi non mutate. In
 quolibet ergo instantium in quibus movetur res visa non muta-
 tur color eius. Et cum visus non comprehendit quiditates
 colorum qui sunt in superficie troci quando trocus movebitur
 motu veloci, et comprehendit ipsos quando trocus fuerit
 80 quiescens vel in motu tardo, et cum ita est, visus ergo non
 comprehendit quiditatem coloris nisi sit color fixus in eodem
 loco tempore sensibili, vel fuerit in motu tempore sensibili in
 spatio cuius quantitas non operatur in situ illius coloris a visu
 operatione extranea.
- 85 [3.59] Declarabitur ergo ex ista dispositione quod compre-
 hensio quiditatis coloris non erit nisi in tempore, et declarabi-
 tur ex ista dispositione quod comprehensio quiditatis omnium
 visibilium non erit nisi in tempore. Quoniam quando visus non

59 super circumferentiam (60) *om. Er* 60 tempus revolutionis (61) *transp. L3*
 61 *post* omnium *add. illorum C1Er/tota circumferentia* (62) *transp. P3* 63 troci *om.*
P1/unus: unius L3/unus color transp. EL3P3R 65 visus comprehendisset *transp. P1*
 66 et . . . instanti (67) *mg. L3/comprehendendum corr. ex comprehensionem P1*
 67 *post* comprehendisset *add. quiditatem eius EP3* 68 instantium: instanti *P1RS/*
temporis corr. ex corporis S 69 distincti: districtim *C1EP3; distinctim ErL3; distinctae*
essent R 70 si non: quando *ErP3R; corr. ex quando a. m. C1; alter. in quando a. m. E*
 71 eorum *om. P3* 72 instantium: instanti *P1RS* 74 eorum *om. C1Er/quiditas:*
quiditates C1ErP1R 75 assuetorum *corr. ex assuetum P3/post mutate scr. et del. in*
quolibet ergo instantium in quibus motu sunt uniusmodi non unitate S 76 ergo:
igitur EL3/instantium: instanti R/quibus: quo EP3R 77 cum: quia *R/quiditates:*
quiditatem EL3P3R 79 ipsos: ipsam *R/fuerit quiescens (80): quieverit R* 80 *post*
vel add. fuerit R/et . . . est om. R/ita corr. ex prima S/ergo om. P1 81 *post* comprehendit
scr. et del. atem P3/quiditatem mg. P3 82 loco tempore *corr. ex tempore loco L3*
 83 illius: istius *R/illius coloris transp. EP3R* 86 et . . . tempore (88) *inter. a. m. E; mg.*
a. m. S 88 erit: est *R/non² scr. et del. S*

comprehendit quiditatem coloris qui comprehenditur solo sen-
 90 su nisi in tempore, maxime indiget comprehensione in tempo-
 re in intentionibus visibilibus que comprehenduntur per distinc-
 tionem et argumentationem. Comprehensio ergo quiditatis visi-
 bilium, et comprehensio per cognitionem, et comprehensio per
 distinctionem et argumentationem non erit nisi in tempore, sed
 95 multotiens erit in minimo tempore.

[3.60] Et etiam dicemus quod color in eo quod est color et
 lux in eo quod est lux non comprehendetur visu nisi in tempo-
 re, scilicet quod instans apud quod erit comprehensio coloris
 in eo quod est color et comprehensio lucis in eo quod est lux
 100 est diversum ab instanti quod est primum instans in quo con-
 tingit superficiem visus aer deferens formam. Quoniam color
 in eo quod est color et lux in eo quod est lux non comprehen-
 duntur a sentiente nisi post proventum forme in corpore sen-
 sibili, et non comprehenduntur ab ultimo sentiente nisi post
 105 proventum forme ad concavum nervi communis. Sed pro-
 ventus forme ad concavum nervi communis non est nisi sicut
 proventus lucis a foraminibus per que intrat lux ad corpora
 opposita illis foraminibus, et proventus lucis a foramine ad
 corpus oppositum foramini non erit nisi in tempore, quamvis
 110 lateat sensum. Quoniam proventus lucis a foramine ad corpus
 oppositum foramini non potest evadere ab altero duorum
 modorum, scilicet quod: aut lux perveniet in parte aeris
 vicinantis foramini antequam perveniat in partem aliam
 sequentem, deinde perveniet ad illam partem, deinde ad aliam
 115 quousque perveniat ad corpus oppositum foramini; aut lux
 perveniet in toto aere medio inter foramen et corpus
 oppositum foramini et in ipso corpore opposito foramini

89 qui: non S 90 indiget: igitur indiget tempore in R/comprehensione:
 comprehensionem P3/post comprehensione scr. et del. in in tempore Er/in²... visibilibus
 (91): intentionum visibilium R 91 in om. P3 92 comprehensio...
 argumentationem (94) om. Er/quiditatis: quiditatum P1S 96 etiam om. EP3R
 97 comprehendetur: comprehenditur C1Er/ante visu add. a C1ErR//visu om. L3/in²
 om. L3 98 post apud scr. et del. stans P3 100 est¹ corr. ex et a. m. C1 101 super-
 ficie: superficies P1 103 post mg. a. m. C1/proventum: perventum R 104 sen-
 tienti: sentiente EL3P3R 105 proventum: perventum R/post proventum scr. et del.
 in corpore sensibili S/sed: et R 106 non om. R/sicut om. P1S 107 proventus:
 perventus R 108 illis: illius Er/et proventus: perventus igitur R 109 non...
 foramini (111) mg. a. m. C1; om. Er 110 proventus: enim perventus R 111 non:
 nec P1/duorum om. P3 112 perveniet: veniet EL3P3R/parte: partem R
 113 perveniat: veniat EL3P3 114 perveniet: pervenit S/illam: aliam C1EL3P3R/
 partem scr. et del. P1/deinde ad aliam om. P1 115 post aut add. quod R 116 toto
 aere medio: totum aerem medium R/post medio add. quod est EP3; add. qui est R
 117 ipso... opposito: ipsum corpus oppositum R

simul. Si ergo aer recipit lucem successive, non pervenit lux ad
 corpus oppositum foramini nisi per motum, sed motus non erit
 120 nisi in tempore. Si autem totus aer recipit lucem simul,
 proventus lucis etiam in aere postquam non erat in eo non erit
 nisi in tempore, quamvis lateat sensum. Quoniam quando
 foramen per quod intrat lux fuerit opilatum, et deinde fuerit
 ablatum opilans, instans in quo fuerit ablatum opilans a prima
 125 parte foraminis et in quo fuerit discoopertus aer qui est in
 foramine ad partem lucis est diversum ab instanti apud quod
 pervenit lux in aere contingenti illam partem que est intra
 foramen et in aere continuato cum illo aere secundum omnes
 dispositiones. Quoniam lux non pervenit in aliqua parte aeris
 130 que est intra foramen quod est coopertum circa lucem nisi
 postquam fuerit discooperta aliqua pars foraminis circa lucem,
 et nulla pars foraminis discooperitur in minori uno instanti,
 sed instans non dividitur. Nichil ergo ex luce pervenit in
 interius foraminis in illo instanti in quo fuerit discooperta illa
 135 pars foraminis, quoniam illud quod est discoopertum ex
 foramine in uno instanti non discooperitur successive, nec illud
 quod discooperitur ex foramine in uno instanti est pars
 alicuius quantitatis. Quoniam non discooperitur in uno
 instanti nisi punctus carens quantitate aut linea carens
 140 latitudine, quoniam non auferetur cooperiens ab habenti
 longitudinem et latitudinem nisi successive—igitur per motum.
 Sed motus non erit nisi in tempore, et illud quod discooperitur
 ex foramine in uno instanti caret latitudine.

[3.61] Est ergo punctus aut linea, sed punctus carens
 145 quantitate et linea carens latitudine non est pars aeris. Punc-
 tus ergo carens quantitate et linea carens latitudine quod est
 punctum quod discooperitur ex foramine in instanti non est

118 recipit: reciperet R/pervenit: perveniret R 119 motus non erit: non erit motus
 EL3P3R/erit: est R 120 recipit: reperit EL3P3 121 proventus: perventus R/aere:
 aerem R/post erat inter: prius a. m. S 123 post fuerit¹ scr. et del. o Er/opilatum:
 obturatum R 124 opilans^{1,2}: obturans R/post opilans¹ add. et S 125 qui:
 quod P15 126 ad corr. ex a E/apud: in R/quod: quo R 127 aere contingenti:
 aerem contingentem R/post est add. in aere EP3; scr. et del. ita E/intra: inter C1L3; apud
 EP3/intra foramen (128) corr. ex foramen inter Er 128 continuato: continuatum R/
 post illo add. in P1 129 aliqua parte: aliquam partem R 130 que: qui R/circa:
 contra C1EErL3P3R 131 circa: contra C1EErP3R; corr. ex contra L3 133 ex luce
 pervenit: pervenit ex luce C1Er/in om. L3 134 illo: isto C1/in quo om. P1/illa: ista
 P1; om. EP3R 135 est: fuit C1Er/ex foramine (136) corr. ex foramine ex Er
 137 in om. L3/post instanti scr. et del. nisi punctus carens quantitate S 139 nisi corr.
 ex nec L3/punctus: punctum R 140 habenti: habente R 142 discooperitur corr.
 ex cooperitur a. m. E 143 ex: a EP3R 144 punctus^{1,2}: punctum R 145 punctus
 (146): punctum R/punctus... aeris (149) mg. L3 146 ergo om. L3 147 punctum
 alter. in primum a. m. C1

nisi finis alicuius partium aeris qui est intra foramen, non pars
 aeris. Et punctus carens quantitate non recipit lucem nec linea
 150 carens latitudine, quoniam non recipit lucem nisi corpus. Et
 cum ita est, nichil pervenit ex luce in aerem qui est intra fora-
 men in instanti in quo discooperitur primum quod discooperi-
 tur ex foramine. Instans ergo quod est punctum instans apud
 quod pervenit lux in aere qui est intra foramen aut in parte
 155 eius est diversum ab instanti in quo discooperitur primum
 quod discooperitur ex foramine. Sed inter quolibet duo instan-
 tia est tempus. Lux ergo non pervenit ex aere qui est extra
 foramen ad aerem qui est intra foramen nisi in tempore, sed
 istud tempus valde latet sensum propter velocitatem recep-
 160 tionis formarum lucis ab aere.

[3.62] Et similiter visus quando fuerit oppositus rei vise
 postquam non erat ita, et fuerit aer deferens formam rei vise
 contingens superficiem visus postquam nichil fuerit ex aere
 contingens ipsum, non perveniet forma ex aere deferente for-
 165 mam ad interius concavi nervi communis nisi in tempore. Sed
 sensus caret via comprehensionis istius temporis propter
 parvitatem eius, et errorem eius, et debilitatem eius ad com-
 prehendum id quod est in fine parvitatatis. Istud ergo tem-
 pus respectu sensus est sicut instans in respectu.

170 [3.63] Et etiam membrum sentiens non sentit formas veni-
 entes ad ipsum nisi postquam patitur ab illis. Non sentit ergo
 colorem in eo quod est color nec lucem in eo quod est lux nisi
 postquam patitur a forma lucis et coloris. Sed passio membri
 sentientis a forma coloris et forma lucis est aliquantula alter-
 175 atio, sed nulla alteratio est nisi in tempore. Visus ergo non
 comprehendit colorem in eo quod est color nec lucem in eo
 quod est lux nisi in tempore. Et in tempore in quo extenditur

148 nisi *om.* P1/*post* partium *add.* eius L3 149 punctus: punctum R/*post* quantitate
 scr. et *del.* et linea carens quantitate S 151 qui: quod P1S 152 primum . . .
 discooperitur (153) *om.* ErP1 153 quod . . . instans *om.* P1S/*post* punctum *add.* vel
 primum EP3R; *inter.* et a. m. C1; *inter.* scilicet L3/apud quod (154): in quo R 154 lux
inter. L3/aere: aerem R/qui: quod C1ES/parte: partibus P3; partem R 156 *post* *inter*
 scr. et *del.* quod L3 157 qui: quid C1Er; quod P1S 158 ad . . . foramen *inter.* L3
 159 istud: illud C1EErP3; id R 161 visus: accidit in visu R/visus quando
 transp. C1ErP3 162 fuerit *om.* R/formam *corr.* ex foramina a. m. C1 163 con-
 tingens: contingerit R/nichil . . . contingens (164): non contingebat R/fuerit: fuit P1
 164 contingens . . . aere *om.* P1/*post* ipsum *add.* prius R/perveniet: pervenit EErl3P3R
 166 temporis *rep.* P1 167 eius² *om.* P1/*post* ad *add.* quod C1Er 168 ante id scr.
 et *del.* ist P3/id: idem L3 169 in respectu *om.* P3R 172 *post* est¹ *add.* quod EP3/
 est² *om.* P3 173 postquam . . . nisi (177) mg. a. m. E/a: ex L3/lucis et coloris: coloris
 et lucis C1Er 174 ante a *add.* aut P3/est *om.* P1/aliquantula: aliqua P3R; *corr.* ex
 aliqua E; *corr.* ex aliquantulatio S 175 in *inter.* L3 176 est *om.* C1/*post* est scr. et
del. lux L3 177 est lux transp. C1Er/et in tempore mg. a. m. S

forma a superficie membri sentientis ad concavum nervi communis erit comprehensio coloris in eo quod est color et lucis in
 180 eo quod est lux a virtute sentiente que est in toto corpore sentiente, et apud proventum forme in concavum nervi communis erit comprehensio coloris in eo quod est color et lucis in eo quod est lux ab ultimo sentiente. Comprehensio ergo coloris in eo quod est color et lucis in eo quod est lux est in tempore
 185 sequenti tempus in quo pervenit forma a superficie membri sentientis ad concavum nervi communis.

[3.64] Et etiam est instans quod est primum apud quod pervenerit forma in superficie visus diversum ab instanti quod est primum instans in quo aer deferens formam contingit primum punctum superficiei visus quando visus fuerit oppositus
 190 rei vise postquam non fuerit ita et postquam oculus apperuerit palpebras postquam fuerint clause. Quoniam quando ita fuerit, primum quod contingit superficiem visus ex aere deferente formam illius rei vise est unus punctus aut linea carens latitudine; deinde pars post aliam quousque fiat aer deferens formam contingens partem superficiei visus in quam pervenit forma. Et apud contactum illius puncti carentis quantitate aut
 195 lineae carentis latitudine superficiei visus ad punctum carens quantitate aut ad lineam carentem quantitate superficiei aeris deferentis formam nichil pervenit ex forma lucis et coloris in superficie visus, quoniam minimum ex superficie in quod pervenit lux aut forma coloris non erit nisi superficies. In instanti ergo in quo contingit punctus superficiei visus primum punctum aeris deferentis formam nichil pervenit ex forma in superficie visus. Instans ergo quod est primum instans apud quod
 205

178 superficie *corr. ex superficiei P1* 179 est *om. EP3* 180 est¹ *om. P1/sentiente corr. ex sensitiva P1* 181 et *om. Er; inter. a. m. C1/proventum: perventum R/nervi communis transp. C1Er* 183 *post ab scr. et del. est in tempore sequenti C1*
 184 est² *om. P1* 185 sequenti: sequente *R/post sequenti add. et est L3S; add. et P1/pervenit forma transp. C1Er* 187 est¹ *om. EP3R/apud quod: in quo R/quod² rep. P3*
 188 pervenerit: pervenit *EP3R/superficie: superficiem R/post visus add. est C1Er/post diversum add. est EL3P3R (inter. L3)* 191 fuerit: fuit *P1P3; fuerat R* 192 fuerint: fuerunt *ER; fiunt P1/post quando scr. et del. ista P3/ita corr. ex prima S/ita fuerit (193) corr. ex fuerit ita P3* 193 *post primum add. quidem L3/quod om. P1; inter. L3/deferente: differente L3* 194 vise *om. P3/unus punctus: unum punctum R*
 195 *post om. P1/deferens: differens L3* 196 contingens: contingat *R/in . . . visus (198) mg. a. m. S* 197 *post carentis scr. et del. in P1* 198 lineae *corr. ex linea a. m. Er/post lineae scr. et del. in P1* 199 quantitate¹ *corr. ex quantitates P3/ad om. S/carentem corr. ex carentuem S/quantitate²: latitudine L3* 200 deferentis: differentis *L3/nichil: nisi ErL3; corr. ex nisi a. m. C1* 201 superficiei¹: superficiem *EP3R/ex: in P3* 203 punctus: punctum *C1R/punctum (204) corr. ex punctus S* 204 deferentis: differentis *L3; deferens S/ex forma om. EL3P3R/superficie (205): superficiem EP3R*
 205 apud quod: in quo *R*

pervenit forma in superficie visus est diversum ab instanti quod est primum instans apud quod contingit aer deferens formam superficiei visus quando visus fuerit oppositus rei vise et apperuerit palpebras eius postquam fuerint clausae.

210 [3.65] Et cum ita est, non pervenit forma lucis aut coloris in aliqua parte membri sentientis nec in superficie visus nisi in tempore. Non comprehendit ergo sentiens colorem in eo quod est color nec lucem in eo quod est lux nisi in tempore; scilicet quod instans apud quod cadit sensus coloris in eo quod est
215 color et lucis in eo quod est lux est diversum ab instanti quod est primum instans apud quod contingit aer deferens formam superficiem visus.

[3.66] Iam ergo declaratum est ex omnibus que diximus quomodo comprehendit visus lucem in eo quod est lux, et quomodo
220 comprehendit colorem in eo quod est color, et quomodo comprehendit quiditatem coloris et lucis, et quomodo comprehendit qualitatem lucis.

[3.67] Sed remotio rei vise a visu non comprehendetur a visu solo sensu, nec comprehensio remotionis rei vise est
225 comprehensio loci rei vise, nec comprehensio rei vise in suo loco est ex comprehensione remotionis eius tantum, nec comprehensio loci rei vise est ex comprehensione remotionis eius tantum. Quoniam locus rei vise sit ex tribus intentionibus, scilicet ex remotione, et ex parte, et ex quantitate remotionis.

230 [3.68] Quantitas ergo remotionis est diversa ab intentione remotionis in eo quod est remotio, quoniam intentio remotionis inter duo corpora est privatio contactus, et privatio contactus est esse aliquod spatium inter illa duo corpora. Et quantitas remotionis est quantitas illius spatii. Intentio ergo remotionis

206 *post forma scr. et del. visus P1/superficie: superficiem EP3R* 207 *apud quod: in quo R* 208 *superficiei: superficiem C1ErR; superficie P3S/post quando scr. et del. super S/visus fuerit transp. EP3R/oppositus: compositus P1* 209 *fuerint: fuerunt R; corr. ex fuerunt E* 210 *est: sit R/post est scr. et del. et C1/non: et Er* 211 *aliqua parte: aliquam partem R/superficie: superficiem R* 213 *nec: et P1S* 214 *quod¹ alter. in quia a. m. C1/apud quod: in quo R* 215 *est¹ om. Er* 216 *primum instans transp. EL3P3R/apud quod: in quo R/contingit corr. ex tingit S* 219 *comprehendit: comprehendat R/post lux scr. et del. et quomodo comprehendit quiditatem coloris et lucis S* 220 *comprehendit: comprehendet L3; comprehendat R/est om. E* 221 *comprehendit: comprehendet L3; comprehendat R/coloris et lucis: lucis et coloris EP3R/et lucis inter. a. m. E/quomodo: qualiter P3; corr. ex qualiter a. m. E* 222 *comprehendit: comprehendet L3; comprehendat R/qualitatem lucis corr. ex quantitatem visus a. m. L3* 223 *sed om. C1EErP3/comprehendetur: comprehenditur EP3R* 225 *suo loco (226) transp. EP3R* 226 *nec . . . tantum (228) om. EP1R; mg. a. m. S* 227 *est om. Er; mg. a. m. C1* 228 *locus: lucis Er/vise om. L3* 229 *post parte add. universi R* 232 *et . . . contactus om. Er; inter. L3* 233 *esse om. C1Er*

235 in eo quod est remotio est ex situ; non est ergo quantitas remotionis. Comprehensio ergo intentionis remotionis, que est privatio contactus, est diversa a comprehensione quantitatis spatii, que est mensura remotionis.

[3.69] Et comprehensio quantitatis remotionis est ex comprehensione magnitudinis, et comprehensio remotionis rei vise et comprehensio partis eius ambo sunt ex comprehensione situs loci. Et qualitas comprehensionis utriusque istorum est diversa a qualitate comprehensionis alterius, quoniam privatio contactus est diversa a parte. Comprehensio ergo loci rei vise
245 non est comprehensio remotionis rei vise.

[3.70] Et comprehensio rei vise in suo loco consistit in comprehensione quinque rerum: scilicet ex comprehensione lucis que est in ea, et comprehensione coloris eius, et comprehensione remotionis eius, et comprehensione partis eius, et
250 comprehensione quantitatis remotionis eius. Et nullum istorum comprehenditur per se solum, nec comprehenditur unum post aliud; sed omnia comprehenduntur simul, quoniam comprehenduntur per cognitionem, non per argumentationem iterandam.

[3.71] Et ex comprehensione rei vise in suo loco opinati sunt ponentes radios quod visio erit per radios exeuntes a visu et pervenientes ad rem visam, et quod visio erit per extremitatem radii. Et ratiocinati sunt contra naturales dicentes, cum visio fuerit per formam venientem a re visa ad visum, et illa
260 forma pervenit ad interius visus, quare comprehenditur res visa in suo loco qui est extra visum, et forma eius iam pervenit ad interius visus? Et non sciverunt isti quod visio non completur solo sensu tantum, et quod visio non completur nisi per distinctionem et cognitionem antecedentem, et si cognitio et

235 in . . . est¹ *rep. E/post est¹ scr. et del.* in eo quod est P3/ergo *inter. E/quantitas: qualitas P1S* 236 est *inter. a. m. E* 237 quantitatis . . . comprehensione (239/240) *om. Er* 239 ex *om. P3* 240 ante magnitudinis *scr. et del.* in L3/remotionis *om. L3/rei vise om. P1* 241 ambo *om. R* 242 ante utriusque *scr. et del.* vir P3/utriusque: cuiuslibet L3/istorum: eorum P1S 243 post comprehensionis *add. remotionis EP3R (alter. ex remotionis comprehensionis in comprehensionis remotionis P3)/post alterius add. illorum EP3R* 244 post diversa *rep. a (243) . . . diversa (244) P1/ergo om. S* 247 comprehensione¹ *corr. ex comprehensio P3/ex: in R* 248 coloris: colore S/eius *om. P3* 250 comprehensione *corr. ex comprehensionis S/eius om. L3* 252 ante simul *add. in EL3P3/quoniam: quando EL3P3R* 256 erit: esset R 257 visio erit *corr. ex erit visio L3/erit: esset R* 258 contra: circa *Er/naturales: physicos R* 262 non sciverunt: nesciverunt C1Er 263 solo . . . completur *om. P3* 264 distinctionem et cognitionem: cognitionem et distinctionem EP3R/antecedentem: antecedentis P1/cognitio et *om. Er/cognitio et distinctio (265): distinctio et cognitio C1*

265 distinctio antecedens non esset, non compleretur in visu visio,
et non comprehendet visus quid est res visa apud visionem.
Quoniam quid est res visa non comprehenditur solo sensu nisi
per distinctionem aut cognitionem aut argumentationem iter-
270 andam apud visionem. Si ergo visio esset solo sensu tantum,
et omnia que comprehenduntur ex intentionibus que sunt in
rebus visibilibus non comprehenduntur nisi solo sensu, non
comprehenditur res visa in suo loco nisi postquam pervenisset
aliquid ad ipsum quod contingeret et sentiret eam. Cum autem
visio non completur solo sensu, sed per distinctionem, et argu-
275 mentationem, et cognitionem, non indiget in comprehensione
rei in suo loco sentiente extenso ad ipsam.

[3.72] Redeamus ergo ad narrandum qualitatem compre-
hensionis visionis, et dicamus quod remotio rei vise non com-
prehenditur per se nisi per distinctionem. Et cum hoc ista
280 intentio est ex intentionibus que quiescunt in anima secundum
tempora pertransita, ita quod non est percepta ab anima
propter nimiam frequentationem et iterationem eius super
virtutem distinctivam, quare non indiget in comprehensione
eius argumentatione iteranda apud comprehensionem cuius-
285 libet rei vise. Nec querit etiam virtus distinctiva etiam apud
comprehensionem cuiuslibet rei vise quomodo quievit intentio
remotionis rei vise in ea, quoniam non distinguit qualitatem
comprehensionis apud comprehensionem cuiuslibet rei vise. Et
non comprehendit remotionem nisi cum aliis intentionibus que
290 sunt in re visa, et comprehendit illam apud comprehensionem
rei vise per cognitionem antecedentem.

[3.73] Quomodo virtus distinctiva comprehendit remotio-

265 compleretur: completur *ErL3* 266 et non: nec *C1Er/comprehendet*:
comprehenderet *C1Er*; comprehendit *R/post visus scr. et del. visio S/apud . . . visa* (267)
om. Er; inter. L3 271 non¹ *om. R/comprehenduntur: comprehenduntur C1Er; corr.*
ex comprehenduntur P1/nisi om. R/post sensu scr. et del. non . . . sensu S 272 com-
prehenditur: comprehenderetur *R/pervenisset corr. ex pervenissent P1* 273 quod:
et *EL3P3*; que *P1S/contingeret: contingerit P1/eam om. P3* 274 argumentationem
et cognitionem (275): cognitionem et argumentationem *P3* 275 indiget: indi-
get *R* 276 ad *rep. P1/ipsam: ipsum P3/post ipsam add. et contingente ipsam*
C1EErL3P3R (mg. a. m. E) 277 comprehensionis (278) *corr. ex comprehensio P3*
278 quod *om. P3R; inter. a. m. E* 279 cum hoc *om. R* 280 post est *add. quod Er*
281 post quod *add. non C1/ante non add. recidit C1EErL3P3/non est om. C1EErL3P3R/*
post percepta add. non recedit R 282 iterationem *corr. ex iterationem P3/eius*
om. EP3 283 indiget: opus est *R* 285 etiam²: et *EP3; om. R* 287 remotionis
om. EP3R/post remotionis add. eius L3/rei vise om. C1Er 288 post et *scr. et del. co S*
289 non *om. Er/comprehendit: comprehendet L3* 291 post antecedentem *add.*
quomodo virtus distinctiva comprehendit illam apud comprehensionem rei vise per
cognitionem antecedentem *P1* 292 post quomodo *add. autem R/comprehendit:*
comprehendat *R/remotionem* (293) *corr. ex renem L3*

nem per distinctionem est secundum quod narrabo. Quando
 est visus oppositus rei vise postquam non fuit oppositus,
 295 comprehendit rem visam, et quando auferetur ab oppositione,
 destruetur comprehensio. Et similiter, quando visus apperu-
 erit palpebras postquam fuerint clausae, et fuerit oppositus
 alicui rei vise, comprehendet illam rem visam, et cum clauserit
 palpebras, destruetur comprehensio. Et in natura intellectus
 300 est quod illud quod accidit in visu apud aliquem situm et
 destruetur apud eius ablationem non est fixum intra visum,
 nec operans ipsum est intra visum. Et in natura intellectus est
 etiam quod illud quod apparet apud apertionem palpebrarum
 et destruitur apud clausionem earum non est fixum intra vi-
 5 sum, nec faciens ipsum accidere est intra visum. Et cum virtus
 distinctiva comprehenderit quod illud quod accidit in visu ex
 quo visus comprehendit rem visam nec est res fixa intra visum,
 nec operans ipsum est intra visum, statim comprehendit quod
 illud quod accidit in visu est veniens ex extrinseco, et operans
 10 ipsum est extra visum. Et cum visio destruitur apud clausio-
 nem palpebrarum et apud ablationem ab oppositione, et sic
 apud apertionem palpebrarum et apud oppositionem, virtus
 distinctiva comprehendit quod illud quod videtur in visu non
 est applicatum ad visum. Et cum virtus distinctiva compre-
 15 hendit quod illud quod videtur non est intra visum nec est
 applicatum cum visu, statim comprehendit quod inter ipsum
 et visum est remotio. Quoniam in natura intellectus est, aut in
 fine manifestationis distinctionis, quod omne quod non est in
 corpore nec est applicatum cum ipso quod sit inter ea remotio,
 20 et hec est qualitas comprehensionis remotionis rei vise in eo
 quod est remotio.

[3.74] Sed virtus distinctiva non indiget in comprehensione

294 est visus: visus fuerit *EErL3P3R*/fuit: fuerit *C1EErL3P3R* 295 comprehendit:
 comprehendet *P3*; *alter. in* comprehendet *E*/auferetur: aufertur *C1ErR* 296 destru-
 etur: destruitur *C1ErR* 297 *post palpebras scr. et del. q L3*/fuerint: fiunt *P1*; fue-
 runt *R* 298 comprehendit: comprehendit *C1ErS/rem om. P1* 299 destruetur:
 distinguetur *P3* 1 destruetur: destruitur *C1ErR* 2 operans: faciens *R*; *corr. ex*
faciens EP3 (a. m. E)/post ipsum add. accidere EP3R 3 etiam *om. P1S*/illud: id *R*/
 quod² *inter. C1*/apparet: accidit *C1Er/apertionem: operationem Er; corr. ex operatio-*
nem C1 4 fixum: visum *EP3* 5 *post nec add. etiam C1Er* 6 comprehenderit:
 comprehendit *C1ErR*; *mg. a. m. E*/illud: id *R* 7 nec: non *C1Er*/fixa: fixum *ErL3*; visa
S; corr. ex fixum a. m. C1 9 illud: id *R*/est veniens: advenit *R/ex om. C1ErL3R*; *inter.*
S/extrinseco: intrinseco P3; extrinsecus R 11 ablationem: oblationem *ErP3*/sic:
 fit *R* 13 illud: id *R*/in visu *om. P3* 14 ad: in *EL3P3*; cum *R*/visum: visu *EL3P3R*
 16 *ante applicatum scr. et del. est P1/comprehendit: comprehendet L3* 19 quod *om.*
R/inter ea remotio: remotum ab eo R 21 est *om. P1S*/est remotio *transp. L3*
 22 distinctiva *corr. ex distina P3*

remotionis rei vise ad dividendum ea que divisimus, quoniam
 non fecimus hoc nisi gratia declarandi. Et virtus distinctiva
 25 comprehendit conclusionem istius distinctionis apud visionem
 sine indigentia illius divisionis. Ex comprehensione ergo rei
 vise apud oppositionem et apertionem palpebrarum, et ex
 destructione eius apud ablationem oppositionis et apud clau-
 sionem palpebrarum, comprehendit virtus distinctiva quod res
 30 visa est extra visum et quod non est applicata cum visu. Et
 secundum istum modum comprehendit virtus distinctiva quod
 inter visum et rem visam sit remotio. Deinde propter frequen-
 tationem istius intentionis et iterationem eius quievit in anima,
 ita quod non percipit quietem eius nec qualitatem quietis eius,
 35 scilicet quod omnia visibilia sunt extra visum et quod inter
 quamlibet rem visam et visum est remotio. Remotio ergo rei
 vise a visu non comprehenditur nisi per modicam distinctio-
 nem, scilicet quod virtus distinctiva comprehendit quod visio
 est propter intentionem extrinsecam a visu. Et cum hoc, quan-
 40 do fuerit quiescens in anima, intelligit virtus distinctiva quod
 quelibet res visa comprehensa a visu est extra visum, et inter
 ipsum et visum est remotio.

[3.75] Et cum hoc, sicut diximus superius, non comprehen-
 ditur remotio nisi cum aliis. Et apud nostrum sermonem de
 45 qualitate comprehensionis situs declarabitur quomodo com-
 prehendetur remotio cum situ, et quomodo comprehendetur res
 visa in suo loco.

[3.76] Comprehensio vero quantitatis remotionis a visu
 diversatur, quoniam quedam comprehenduntur per sensum
 50 visus et certificatur earum quantitas, et quedam comprehen-
 duntur quorum quantitas non certificatur. Remotio rei vise a
 visu comprehenditur in qualibet re visa, et certificatur in qua-
 libet re visa. Quantitas autem remotionis non certificatur
 a visu in qualibet re visa, quoniam inter quedam visibilia et

23 rei vise *om. C1Er* 25 istius: illius *C1Er/visionem: divisionem P1S* 27 vise
om. EP3R/et apertionem om. Er/palpebrarum corr. ex palpebrarum P3 28 eius
inter. L3/ablationem: oblationem Er 29 quod . . . distinctiva (31) *om. Er; mg. a. m. C1*
(quod . . . visum (30) (??) C1) 30 cum visu et (??) *C1* 31 distinctiva (??) *C1*
 32 sit: est *C1Er/frequentationem (33): sequestrationem P1S* 33 iterationem:
certificationem P1 39 quando (40) *om. P1S* 42 ipsum: ipsam *EL3P3R*
 43 cum hoc: etiam *R* 44 et *om. Er; mg. a. m. C1* 45 comprehendetur (46):
comprehendatur R 46 comprehendetur: comprehenditur *C1EErL3P3;*
comprehendatur R 47 suo loco *transp. EP3R* 948 vero: ergo *P1S; alter. in ergo*
a. m. E 50 earum: eorum *EP3R; alter. in eorum a. m. C1/quantitas: qualitas Er/corr.*
ex qualitas a. m. C1 51 post certificatur *scr. et del. earum quantitas S/a visu (52)*
om. P3 52 post certificatur *add. visui P1* 54 a visu: visui *EL3P3R; om. P1S*

- 55 visum sunt corpora ordinata continuata, et inter quedam vero
et visum non sunt corpora ordinata continuata, nec remotio
eorum respicit corpora ordinata continuata. Illa ergo quorum
remotio respicit corpora ordinata continuata, quando visus
comprehenderit corpora ordinata que respiciunt remotionem
60 eorum, scilicet visibilium, comprehendet quantitates illorum
corporum. Et cum comprehenderit mensuras illorum corporum,
comprehendet quantitates spatiorum que sunt inter extremitates
illorum. Et spatium quod est inter duas extremitates
corporis visi quod respicit remotionem que est inter visum et
65 rem visam quarum altera est in parte rei vise et altera in parte
aspicientis est remotio rei vise a visu, quoniam respicit spatium
quod est inter visum et rem visam. Cum ergo visus comprehenderit
mensuram istius spatii, comprehendet mensuram remotionis rei vise.
Visus ergo comprehendit quantitatem
70 remotionum rerum visibilium quarum remotio respicit corpora
ordinata continuata ex comprehensione mensurarum corporum
ordinatorum respicientium remotiones earum.

- [3.77] Et remotio quarumdam rerum istarum visibilium est
mediocris, et remotio quarumdam est extra mediocritatem.
75 Remotio ergo visibilium quorum remotio est mediocris comprehenditur
a visu vera comprehensione certificata, quoniam visibilia
quorum remotio est mediocris, et inter ipsa et visum sunt
corpora ordinata continuata, comprehenduntur a visu vera
comprehensione. Et cum visus comprehendit ista visibilia vera
80 comprehensione, comprehendet corpora ordinata interiacentia
ipsum et ipsa visibilia vera comprehensione. Et cum comprehendit
ista corpora vera comprehensione, comprehendet spa-

55 *post continuata scr. et del. nec remotio eorum C1/et om. R/et . . . continuata (56) mg. a. m. E/vero: non C1Er (scr. et del. C1); corr. ex non EL3* 56 visum: visa EP3/*post visum add. et C1Er (scr. et del. C1)/continuata om. L3* 57 respicit: respicit Er/illa . . . continuata (58) *mg. a. m. E/illa ergo transp. EL3P3/post ergo add. quoque L3* 58 respicit: recipit Er 59 comprehenderit: comprehendit L3/*respiciunt: recipiunt L3* 60 scilicet *om. R/post visibilium add. quando EP3R; add. qua L3P1S (alter. in quando a. m. S)/post comprehendet add. scilicet EP3R/quantitates: quantitas L3* 62 spatiorum que sunt *corr. ex que sunt spatiorum E/inter alter. ex super in intra L3* 63 illorum: eorum P1S 64 corporis *corr. ex corpus S/visi: nisi Er/respicit: respicit Er* 66 a visu *om. P1; inter. a. m. S/quoniam corr. ex quando L3/post quoniam inter. replet et a. m. S* 67 comprehenderit (68): comprehendet EP3R 68 istius: illius P1/*comprehendet: comprehenderet Er* 69 comprehendit: comprehendet P1 72 respicientium *corr. ex respiciens a. m. C1/earum om. P1* 73 istarum *corr. ex visarum C1* 74 mediocritatem: medietatem P3; *corr. ex medietatem a. m. E* 75 *post est scr. et del. visibilis P3* 76 vera comprehensione *transp. EP3R* 77 et: etiam P3/*ipsa: quae R/post ipsa scr. et del. i S* 79 ante et *scr. et del. comprehendet S* 80 comprehendet: comprehendit EL3P3 81 ante ipsum *add. inter EP3R/comprehendit (82): comprehenderit C1* 82 ista *corr. ex ipsa Er/comprehendet: comprehendit R*

tia interiacentia extremitates eorum vera comprehensione. Et
 cum comprehenderit spatia vera comprehensione, comprehen-
 85 det mensuras remotionum visibilium respicientium ista spatia
 vera comprehensione certificata. Visibilia ergo quorum remotio
 est respiciens corpora ordinata continuata et quorum remotio
 a visu est mediocris, visus comprehendit mensuras remotio-
 num eorum vera comprehensione et certa—et est dicere certa in
 90 ultimitate in qua poterit sensus comprehendere.

[3.78] Mensure vero remotionum visibilium quorum remotio
 est extra mediocritatem et quorum remotio respicit corpora
 ordinata continuata, et cum hoc sunt comprehensa a visu, non
 comprehenduntur a visu vera comprehensione certificata, quo-
 95 niam visibilia quorum remotio est extra mediocritatem non
 comprehenduntur a visu vera comprehensione. Et cum inter
 visum et ista visibilia fuerint corpora ordinata continuata, non
 comprehenduntur a visu omnia ista visibilia vera comprehen-
 sione propter extraneitatem remotionum extremitatum suarum
 100 et exitus eorum a mediocritate per quam visus certificat visi-
 bilia. Et cum visus non comprehendet ista corpora vera com-
 prehensione, non comprehendet spatia interiacentia extremita-
 tes vera comprehensione. Non comprehendet ergo remotiones
 que sunt interiacentes ipsum et visibilia que sunt apud extre-
 105 mitates istorum corporum vera comprehensione. Quantitates
 ergo remotionum visibilium quorum remotio est extra mediocri-
 tatem, et inter ipsam et visum sunt corpora ordinata continu-
 ata, non comprehenduntur a visu vera comprehensione.

[3.79] Remotiones autem visibilium quorum remotio non
 110 respicit corpora ordinata continuata non comprehenduntur
 quidem a visu vera comprehensione, quare visus, quando

83 *post interiacentia add. inter R* 84 *spatia om. P3* 86 *post comprehensione add. et R* 87 *est respiciens: respicit R/respiciens corr. ex repiciens L3* 88 *visus . . . remotionum (89): mensuras remotionum visus comprehendit R/comprehendit: comprehendet P1* 89 *eorum om. R; corr. ex erum S/et¹ om. C1EErL3P3/certa² om. P3* 91 *vero: ergo P1* 93 *ordinata corr. ex coordinatur C1; inter. a. m. E/et om. P1S/et . . . comprehensa: si comprehenduntur R* 94 *comprehenduntur: comprehenduntur C1EErP3R/a visu om. R/post comprehensione add. et R* 95 *mediocritatem: medietatem L3* 96 *cum corr. ex quamvis a. m. S* 97 *fuerint: fiunt L3* 98 *comprehenduntur: comprehenduntur C1ErP1P3/ista om. P3* 99 *extraneitatem: extremitatem P3/remotionum corr. ex remotionis P1/suarum om. P1; inter. a. m. S* 100 *visus om. P3* 101 *comprehendet: comprehendat R* 102 *non . . . comprehensione (103) mg. a. m. S/post interiacentia add. inter R* 103 *comprehensione corr. ex comprehensioi P3* 104 *post interiacentes add. inter R* 107 *ipsam: ipsa C1Er; quam R* 109 *ante remotiones add. similiter R/autem om. R* 110 *respicit corr. ex recipit Er* 111 *quidem om. C1ErR/vera corr. ex illa L3/vera comprehensione om. Er; inter. a. m. C1/post vera add. vel illa EP3/quando: non P3*

comprehenderit nubes in plano et in locis carentibus montibus,
 existimabit quod sint magne remotionis in respectu corporum
 celestium. Et cum nubes fuerint inter montes et fuerint con-
 115 tinue, forte cooperientur cacumina montium a nubibus, et
 cum nubes fuerint distantes, forte apparebunt cacumina mon-
 tium superiora nubibus, et forte comprehendet visus partes
 nubium applicatas cum ventre montium, et forte erit hoc in
 montibus non valde altis. Ex ista ergo experimentatione vide-
 120 tur quod remotio nubium non est extranea, et quod plures illa-
 rum sunt propinquiores terre cacuminibus montium, et quod
 illud quod existimatur de extraneitate remotionis illarum est
 error. Et declarabitur inde quod visus non comprehendit men-
 suram remotionis nubium in plano, et quod mensura remotio-
 125 nis nubium comprehendetur a visu quando fuerint inter mon-
 tes, et apparuerint cacumina montium superius.

[3.80] Et hoc invenitur etiam in pluribus visibilibus que
 sunt super faciem terre, scilicet quod mesure remotionum non
 respicientes corpora ordinata continuata non comprehendun-
 130 tur a visu. Ex illis ergo ex quibus manifestatur hoc, scilicet
 quod visus non comprehendit quantitatem remotionis rei vise
 nisi quando remotio eius fuerit respiciens corpora ordinata
 continuata, et comprehenderit visus illa corpora, et certifica-
 verit mensuras eorum, est ut paret experimentator domum in
 135 qua non intret ante horam experimentationis. Et sit in quibus-
 dam parietibus illius domus strictum foramen, et sit post illud
 foramen vacuitas quam ante illam horam non vidit. Et sint in
 illa vacuitate duo parietes quorum unus sit propinquior fora-

112 comprehenderit: comprehendit L3 113 remotionis: remotiones P3 115 co-
 operientur: cooperiantur S 116 fuerint distantes: distiterint R/post distantes add.
 una ab altera EP3R/post apparebunt scr. et del. mo Er 118 nubium: montium P1;
 corr. ex montium a. m. S/applicatas corr. ex applicantes a. m. C1/ventre: vertice EL3P3R;
 alter. in vertice a. m. C1S/montium: nubium ErP1; corr. ex nubium a. m. C1S
 119 montibus: nubibus P1; corr. ex nubibus a. m. S/videtur (120): apparet R
 122 extraneitate: extremitate P1S; corr. ex extremitate L3/est error (123) transp. EL3P3R
 124 mensura om. P3/mensura remotionis (125) transp. P1 126 apparuerint:
 apparuerunt L3P3/superius: superiora R 127 et om. P1/pluribus: puribus L3/
 visibilibus: visibus P1 128 mesure corr. ex mensura P1 129 respicientes:
 aspicientes L3/comprehenduntur (130): comprehenduntur C1EErP3R 130 ex¹:
 et P1S 131 comprehendit: comprehendat R/quantitatem: quiditatem P1S
 132 fuerit respiciens: respexerit R/respiciens om. L3 133 comprehenderit:
 comprehendit L3/post corpora add. interposita EP3R/post et² add. comprehenderit vel
 EP3 (comprehenderit alter. ex comprehenderi P3) 134 est: esto Er; corr. ex esto C1/
 ut . . . experimentator: experimentatio sequens sit R/paret: apparet P3; corr. ex apparet
 L3; alter. in apparet a. m. E/domum: domus P3R (alter. ex domu P3) 135 qua: quam
 C1ErR/post qua add. experimentator R/intret: intraverit R; corr. ex erat a. m. S/sit corr.
 ex sint P3/quibusdam parietibus (136): quodam pariete R 138 post illa scr. et del.
 experimentatione P1/sit om. C1Er

mini alio, et sit inter illos duos parietes distantia alicuius
 140 quantitatis. Et sit paries propinquior cooperiens quandam
 partem parietis remotioris, et sit quedam pars parietis remo-
 tioris apparens. Et sit foramen elevatum a terra ita quod,
 quando aspiciens aspexerit per ipsum, non videat faciem terre
 que est post parietem in quo foramen est. Experimentator
 145 quidem, quando intraverit istum locum et inspexerit istud
 foramen, videbit duos parietes in simul, et non comprehendet
 remotionem que est inter ipsos. Si vero remotio primi parietis
 fuerit magna remotio extranea a foramine, comprehendet duos
 parietes quasi se contingentes, et forte existimabit quod sint
 150 unus continuus quando color eorum fuerit unus. Et si paries
 primus fuerit remotus a foramine mediocriter, et percipiatur
 quod sint duo parietes, existimabitur quod sunt duo propinqui
 sibi aut se contingentes, et non certificabitur remotio que est
 inter ipsos. Et cum comprehenderit primum parietem visus,
 155 quando remotio eius fuerit mediocris, quasi esset propinquus,
 et non certificabit remotionem eius etiam. Et non certificabitur
 remotio que est inter ista duo corpora huiusmodi per sensum
 visus quando ante illam horam non vidit illum locum nec illos
 duos parietes. Et forte comprehendit visus illa duo corpora
 160 quasi se contingentia, quamvis ante sciverit distantiam que est
 inter ea.

[3.81] Et cum visus non comprehendit remotionem que est
 inter duo corpora huiusmodi, non comprehendet quantitatem
 remotionis ultimi corporis, et cum hoc comprehendit formam
 165 eius. Et cum non comprehendit quantitatem remotionis istius
 corporis, quamvis comprehendat istud corpus, non compre-
 hendet corpora continuata respicientia remotionem eius, et non

139 ante alio add. altero EL3P3; add. quam alius R/illos: alios P1 140 sit paries
 transp. S/paries corr. ex parietes S 141 parietis¹ om. P1/et... pars inter. L3/post pars
 inter. remotioris L3/parietis remotioris (142) transp. P1S/remotioris (142) om. L3
 142 elevatum inter. L3/elevatum a terra: a terra elevatum L3/quod: ut R 143 terre
 om. P1 144 foramen est transp. C1Er 145 quidem: igitur R/intraverit: accesserit
 ad R/ante istud add. per EP3R 146 in om. R 147 remotio om. S/remotio...
 parietis: primi... remotio P1 149 sint: sit P3R 150 quando... unus mg. a. m.
 E/eorum om. P3/fuerit unus corr. ex unus fuerit P3 151 mediocriter: mediocris S
 152 sunt: sint C1ErL3P3R/duo² om. C1EErP3R/propinqui sibi (153) transp. Er
 156 et¹: alteri EP3R/etiam et transp. L3/non² inter. L3 157 inter ista duo corr. ex ista
 duo inter Er/ista: illa L3 158 quando: quoniam P3R; corr. ex quoniam a. m. E/illam
 om. P1S/vidit: viderit EP3; viderat R/illum: istum R 159 comprehendit:
 comprehendet R; corr. ex comprehendet Er 162 comprehendit: comprehendat R
 163 comprehendet: comprehendit EP3R 164 cum hoc: tamen R/formam om. P1
 165 post eius add. corporis R/cum inter. L3/comprehendit: comprehendat R/istius cor-
 poris (166) om. P1 166 istud: illud EL3P3R/non: nisi C1EL3P3 167 et om. C1Er;
 inter. a. m. E

comprehendet visus quantitatem remotionis rei vise certe ex
 comprehensione forme rei vise. Et non comprehendit visus
 170 quantitatem remotionis rei vise nisi per argumentationem.
 Visus autem non arguit super aliquam mensuram nisi per com-
 parationem illius mesure ad aliam mensuram iam comprehen-
 sam a visu vel ad mensuram tunc comprehensam cum ea; et
 nichil est per quod visus potest mensurare remotionem rei vise
 175 et comparare ad ipsum ita quod comprehendat mensuram eius
 vere nisi corpora ordinata respicientia remotionem rei vise. Si
 autem mensuraverit visus remotionem per alia quam per ista
 corpora, erit mensuratio qualiscumque, non certa. Non igitur
 comprehenditur quantitas remotionis rei vise a sensu visu nisi
 180 sit remotio eius respiciens corpora ordinata continuata, et com-
 prehendit visus illa corpora et mensuras illorum.

[3.82] Et ista experimentatio quam diximus habet multa
 similia ex visibilibus, sicut ex duabus arboribus erectis secun-
 dum modum quem diximus in parietibus, aut ligno ex trans-
 185 verso posito foramini secundum modum quem diximus de
 pariete primo.

[3.85] Remotiones autem visibilium distantium adinvicem
 comprehenduntur a visu ex comprehensione divisionis que est
 inter visibilia. Dispositiones autem quantitatis remotionum
 190 visibilium adinvicem sunt apud visum sicut dispositiones re-
 motionum visibilium a visu. Quoniam due res vise atque dis-
 tincte, si inter eas fuerint corpora continuata et ordinata, et
 comprehenderit visus illa corpora et mensuras eorum, com-
 prehendit quantitatem remotionis que est inter illas res duas
 195 visas; si autem non, non comprehendet quantitatem distantie
 que est inter illas vere. Et similiter, si inter illas duas res visas

168 comprehendet: comprehendit *P1/remotionis mg. a. m. E/ex mg. a. m. C1*
 169 forme rei vise: rei vise forme *S* 171 *post per add. argumentum comparationis*
sive per EP3R 173 tunc comprehensam *transp. C1Er/cum alter. in ab a. m. E*
 174 potest: *post Er* 175 comparare *corr. ex parare a. m. E/ipsam: ipsam R/quod:*
ut R 176 remotionem: remotionum *Er* 177 *per² om. Er* 179 visu:
visus EP3 180 *sit om. R/respiciens: respexerit R; corr. ex respicientia P1/et om. R*
 181 comprehendit: comprehendat *C1Er; comprehenderit P1S/ante visus add. enim R*
 182 experimentatio *corr. ex experimentatione L3* 183 *ex¹: in R/visibilibus: simili-*
bus P1 184 quem: quam *P1S/parietibus: patientibus P3/post aut add. in R/ex om.*
R/transverso (185): transversim R 185 foramini: super foramen *R/quem: quod P3*
 186 pariete: pariente *E* 187 distantium: distinctorum *P1; corr. ex distinctorum*
a. m. S 189 remotionum: remotionis *EP3R/remotionum visibilium (190)*
transp. C1Er 190 adinvicem: inter se *R* 191 *post quoniam add. quando P1S/due*
... eas (192): si inter duas res visas distinctas R/atque om. C1Er 192 *si om. P1S/*
continuata et ordinata: ordinata et continuata EP3R/et¹ om. R 193 eorum: illorum
C1P1 194 illas *om. R/duas om. R/duas visas (195) transp. EP3* 195 *non¹ inter.*
a. m. S/non² inter. a. m. ES/comprehendet: comprehendat E; comprehendit P1; corr. ex
comprehenderit S 196 *si om. S/illas²: istas EP3R*

fuerint corpora ordinata continuata, et fuerint valde extranee
remotionis ita quod visus non poterit certificare mensuras
illorum corporum, non certificabitur mensura que est inter illa
200 duo corpora.

[3.86] Remotiones ergo visibilium a visu non comprehen-
duntur nisi ex comprehensione virtutis distinctivae, quoniam
illud quod accidit in visu apud visionem non accidit nisi per
aliquid extrinsecum. Et nulla quantitas remotionis visibilium
205 comprehenditur per sensum visum vera comprehensione nisi
remotiones visibilium quorum remotio respicit corpora ordi-
nata et continuata et quorum remotio cum hoc est mediocris, et
visus cum hoc etiam comprehendit corpora ordinata respicien-
tia remotiones eorum et certificat mensuras illorum corporum,
210 ut se sequuntur. Mensura autem remotionum preter huiusmodi
non certificantur a visu. Visibilia autem quorum mensura re-
motionum earum non certificantur a visu quedam remotiones
eorum sunt respicientes corpora ordinata continuata, et visus
cum hoc comprehendit illa corpora, et sunt illa quorum ex-
215 tremitatum remotio est extranea. Et quedam remotiones eo-
rum sunt respicientes corpora ordinata continuata, sed visus
non comprehendit illa corpora, sive sint remotiones eorum
extranee sive mediocres. Et quedam remotiones eorum non
respiciunt corpora ordinata continuata, et sunt illa visibilia
220 que sunt valde elevata a terra que sunt extranee remotionis et
que non habent prope ipsam remotionem nec parietem respici-
entem remotionem eorum. Et omnia visibilia dividuntur in
istas partes.

[3.87] Et quando visus comprehendit visibilia quorum

197 *post ordinata add. et C1Er/continuata om. P3* 198 *quod: ut R/poterit: possit R*
199 *certificabitur mensura: certificabit mensuram C1Er/illa . . . corpora (200): illas*
duas res visas R 202 *post ex scr. et del. corpore S/comprehensione corr. ex*
comprehensionis S/virtutis: virtus S 203 *post quod scr. et del. n S/in: a L3*
204 *aliquid: aliud L3/remotionis: remotionum Er* 207 *et² om. EL3P3R/cum hoc:*
simul R/est om. Er 208 *cum hoc: una R* 210 *ut om. C1Er/se om. C1ErP1P3/*
sequuntur: consequenter C1Er; consequuntur R; alter. in sequitur deinde in consequuntur
L3; alter. ex sequitur in consequitur vel consequenter a. m. S/post sequuntur add. vel
consequuntur E; add. vel sequuntur P3 211 *autem: ergo EP3* 212 *earum:*
mensurae R 213 *eorum . . . respicientes: respiciunt R* 214 *cum scr. et del. Er/*
cum . . . corpora: comprehendit illa corpora cum hoc EP3R/post hoc inter. non a. m. Er/
post illa² add. corpora EP3R 215 *est extranea transp. L3* 216 *sunt respicientes:*
respiciunt R/visus om. P1 217 *post corpora scr. et del. et sunt illa quorum extremitatum*
re P1 218 *post sive add. sint EP3R/post remotiones scr. et del. sunt P3/post eorum*
inter. que L3; add. sunt E 219 *respiciunt: respicientes EP3/et om. EL3P3/sunt corr.*
ex super a. m. E 221 *prope corr. ex proprie C1L3/ipsam inter. L3/respicientem (222):*
respicientes P3 222 *remotionem: remotiones C1ErP3/post omnia scr. et del.*
visus P1 223 *post partes scr. et del. n C1* 224 *post comprehendit add. illa L3*

225 remotionum quantitates non certificantur a visu, distinctiva
virtus statim cognoscit mensuras remotionis eorum secundum
estimationem, non secundum rectitudinem. Et comparat
remotionem earum ad remotionem sibi similium ex visibilibus
230 comprehensis a visu ante, et sustentat se in argumentatione
super formam rei vise, et comparat formam rei vise ad formam
visibilium similium quas visus comprehendit ante et quorum
quantitates remotionum iam certificantur a virtute distinctiva.
Et sic comparat remotionem rei vise cuius quantitatem remoti-
onis non certificat ad remotionem visibilium sibi similium quas
235 comprehendit visus ante et quorum remotionum mensure cer-
tificantur iam a virtute distinctiva. Cum ergo virtus distinctiva
non certificaverit lineationes forme rei vise, comparabit quanti-
tatem totius forme eius ad mensuras formarum visibilium
equalium illis formis in mensura quarum quantitates remotio-
num iam certificate sunt, et assimilabit remotionem rei vise
240 cuius quantitas remotionis non certificatur ab eo ad remotio-
nem visibilium equalium vise in mensura quorum remotiones
iam sunt certificate.

[3.88] Et hoc est maximum super quod potest virtus
245 distinctiva in comprehendendo mensuras remotionum visi-
bilium. Forte ergo inveniet per istam argumentationem cer-
titudinem in comprehendendo remotionem illius quod est
huiusmodi, et forte errabit. Et in illis in quibus invenit certitu-
dinem non certificatur utrum invenit certitudinem an non. Et
250 ista argumentatio erit argumentatio in fine velocitatis propter
assuetudinem virtutis distinctivae in comprehendendo remotio-
nem visibilium per argumentationem et certificationem.

[3.89] Et forte existimabit virtus distinctiva mensuram re-
motionis rei vise, si fuerit remotio eius respiciens corpora ordi-

225 remotionum *corr. ex remotionem L3/distinctiva corr. ex distincta a. m. E/distinctiva*
virtus (226) *transp. R* 226 *post remotionis scr. et del. eciti S* 227 *estimationem*
corr. ex estimationibus P1 228 *earum: eorum EP3R/visibilibus corr. ex visibili-*
um P1 231 *quorum: in quibus R* 232 *quantitates: quantitas P1S/certificantur:*
certificatur P1S 234 *ante non scr. et del. et L3/remotionem: remotiones C1Er/quas:*
quae R 235 *post quorum scr. et del. in Er/certificantur iam (236) transp. EP3R*
236 *ergo: autem L3* 238 *mensuras corr. ex mensuram P1* 239 *post quarum*
scr. et del. extremitatem P1/quantitates remotionum (240) transp. EP3 240 *post*
sunt add. in virtute distinctiva EP3R 241 *certificatur: certificabitur R/ad inter.*
a. m. E/remotionem (242): remotiones C1Er 242 *equalium om. EL3P3R/vise*
om. C1EErL3P3R 244 *hoc inter. a. m. E/hoc est transp. EP3R* 248 *huiusmodi corr.*
ex huius S/forte corr. ex forma L3/invenit: inveniet EP3R 250 *post erit scr. et del.*
er P1 251 *ante virtutis add. vel assiduitatem EP3/ante in scr. et del. et L3* 252 *post*
et add. per C1Er 253 *mensuram: mensuras R* 254 *fuerit om. R/respiciens: res-*
pexerit R

255 nata, et fuerit ex remotionibus mediocribus, propter assuetu-
 dinem virtutis distinctivae in existimando vel arguendo remoti-
 ones visibilium et propter velocitatem cum sue estimationis
 argumentatione. Et cum remotio rei vise fuerit mediocris, non
 erit inter estimationem remotionum et inter veram remotionem
 260 magna diversitas.

[3.90] Cum ergo visus comprehenderit aliquam rem visam,
 statim virtus distinctiva comprehendet remotionem eius et
 mensuram remotionis eius secundum quod poterit compren-
 dere—scilicet aut per certitudinem aut estimationem—et sta-
 265 tim remotio eius habebit in anima mensuram ymaginatam.
 Mensura ergo remotionis rei vise comprehensa a visu cuius for-
 ma est ymaginata in anima, quando illa remotio fuerit respiciens
 corpora ordinata continuata, et cum hoc fuerit illa remotio
 mediocris, et cum hoc comprehenderit visus illa corpora ordi-
 270 nata respicientia eius remotionem, et cum hoc iam virtus distinc-
 tiva cognoverit ipsa et certificaverit mensuras eorum, tunc men-
 sura certificata est.

[3.91] Si autem eius remotio non fuerit respiciens corpora
 ordinata continuata, aut fuerit respiciens corpora ordinata
 275 continuata, et comprehenderit visus illa corpora, et fuerit cum
 hoc remotio extranea ita quod visus non potest certificare
 mensuras illorum corporum, aut fuerit visus respiciens corpora
 continuata ordinata, et non comprehenderit visus illa corpora
 nec certificaverit mensuras eorum, aut poterit comprehendere
 280 illa corpora, sed non aspexerit illa tunc nec mensuraverit
 quantitates eorum, sive sint remotiones illorum visibilium

255 *post ex scr. et del. m P3/propter mg. Er/assuetudinem* (256): *assiduitatem C1Er;*
assuetudine P3 256 *in: et Er* 257 *sue estimationis mg. a. m. E/estimationis corr.*
ex estimatione P3 258 *cum om. L3* 259 *remotionum: remotionis ErR/post*
remotionem scr. et del. in P1 262 *et . . . eius (263) inter. a. m. E* 263 *eius om. P1S/*
post quod scr. et del. id S/comprehendere (264): comprehenderit Er 264 *aut²: autem*
S/post aut² add. per EP3R 265 *in anima inter. a. m. E/ymaginatam: conceptam R*
 266 *est ymaginata (267) transp. C1Er* 267 *ymaginata: concepta R/quando corr. ex*
quoniam a. m. E/post quando scr. et del. illa remotio fuerit S/fuerit respiciens: respex-
erit R 268 *cum hoc: simul R/hoc om. P1P3S/illa remotio om. R* 269 *cum hoc*
om. R 270 *cum hoc: etiam R* 271 *ipsa: ipsam C1P3R; corr. ex ipsam E/eorum*
. . . mensura: corporum ordinatorum R/tunc om. P3/tunc . . . est (272): est tunc . . .
certificata C1EErP3 272 *certificata corr. ex ordinata EP3 (a. m. E)* 273 *non: tunc*
EP3/fuerit respiciens: respexerit R 274 *aut . . . continuata (275) inter. a. m. S/fuerit*
respiciens: respexerit R 275 *et¹ inter. a. m. E/fuerit cum hoc (276): cum hoc fuerit*
C1EErP3R/cum hoc (276): simul R 276 *quod: ut R/potest: possit R/post certificare*
add. illas L3 277 *fuerit . . . respiciens: respexerit R* 278 *continuata ordinata*
transp. L3P3R/comprehenderit: comprehendit Er; corr. ex comprehenditur P1
 279 *eorum inter. L3/poterit: possit R* 280 *non om. EP3/post illa² scr. et del. sepe P1/*
mensuraverit: mensuravit C1ErL3P3 281 *illorum: istorum L3*

extranee sive mediocres, erit tunc mensura eius que est ymaginata in anima non certificata nec verificata.

[3.92] Et remotiones que sunt inter visibilia distincta non
 285 comprehenduntur nisi ex comprehensione divisionis que est
 inter visibilia, et quedam quantitates remotionum que sunt inter
 visibilia divisa comprehenduntur vera comprehensione, et
 quedam comprehenduntur per estimationem. Mensura ergo
 remotionis que est inter duo visibilia inter que sunt corpora
 290 ordinata continuata, et visus comprehenderit illa corpora et
 certificaverit mensuras eorum, est mensura certificata. Mensura
 autem remotionis que est inter duo visibilia inter que non
 sunt corpora continuata ordinata, aut inter que sunt corpora
 continuata ordinata, sed visus non certificat mensuras illorum
 295 corporum aut non comprehendet illa corpora, est mensura non
 certificata. Secundum ergo istos modos erit comprehensio remotionum
 visibilium per sensum visus.

[3.93] Et etiam corpora respicientia remotiones visibilium
 assuetorum que sunt in remotionibus assuetis que assuete
 300 comprehenduntur a visu comprehenduntur a visu, et certificantur
 mesure eorum propter frequentationem eorum a visu
 ita quod visus propter hoc comprehendit mensuras remotionum
 eorum per cognitionem. Quoniam visus, quando comprehenderit
 aliquod visibile assuetum, et fuerit in remotione assueta,
 5 cognoscet ipsum, et cognoscet eius remotionem, et existimabit
 quantitatem remotionis eius. Quando ergo existimaverit
 quantitatem remotionis huiusmodi visibilium, erit estimatio
 eorum prope verum, et non erit inter estimationem eius et inter

282 mediocres: mediocris *Er/post* eius *add.* remotionis *R/que corr. ex* quod *L3/y*maginata (283): concepta *R* 283 non: nec *R/post* non *add.* mensurata nec *EP3/certificata corr. ex* certificabitur *P1/nec* verificata *mg. L3* 285 comprehensione divisionis *transp. L3/que* est *om. P1S* 286 *post* inter *add.* illa *R/sunt* inter. *L3*
 287 divisa: distincta *EP3R* 289 inter² inter. *a. m. E* 290 et¹: quae *R/comprehenderit: comprehendit C1R/illa . . . et: et* quorum *R* 291 certificaverit: *certificat C1EerP3R/eorum om. R* 293 continuata ordinata *transp. EerP3R/post* ordinata inter. est *a. m. Er/aut . . . ordinata* (294) inter. *L3* 294 continuata ordinata *transp. EP3R/illorum: eorum L3P1S* 295 corporum *om. P1S/aut corr. ex* autem *S/comprehendet: comprehendit R/corpora om. R/mensura: mensurata P1*
 296 remotionum (297) *corr. ex* remotionem *S* 298 remotiones: remotionis *P1*
 299 remotionibus: remotiones *Er; corr. ex* remotionis *a. m. C1* 300 comprehenduntur² a visu *scr. et del. Er; om. L3P3* 1 mesure eorum *transp. L3/eorum¹ om. P1; inter. a. m. S/propter: per P1S/eorum² scr. et del. S/a* visu *om. R* 2 quod: ut *R/comprehendit: comprehendat R; comprehendet S* 3 visus quando *transp. S/comprehenderit* (4): comprehendit *EP3R* 4 aliquod: aliquid *E* 6 quando *corr. ex* quoniam *S/estimaverit: estimabit EP3R* 7 remotionis *om. P1/post* remotionis *scr. et del. eius L3/estimatio corr. ex* estimandum *P1* 8 verum: vera *R/inter² om. EP3R*

veritatem magna diversitas. Quantitates ergo remotionum
 10 visibilium assuetorum que sunt in remotionibus assuetis com-
 prehenduntur a visu per cognitionem et estimationem quanti-
 tatum eorum. Et plures remotiones visibilium comprehendun-
 tur secundum modum huiusmodi.

[3.94] Situs vero quem visus comprehendit ex visibilibus
 15 dividitur in tres modos quorum unus est situs totius rei vise
 apud visum aut situs cuiusdam partium rei vise apud visum.
 Et iste modus est oppositio. Secundus est situs superficiei rei
 vise oppositae visui apud visum, et situs superficierum rei vise
 oppositarum visui apud visum quando res visa fuerit multa-
 20 rum superficierum, et fuerit illud quod apparet ex eis visui
 multe superficies, et situs terminorum superficierum visibilium
 apud visum, et situs linearum et spatia que sunt inter quelibet
 duo puncta aut inter quelibet duo visibilia que simul compre-
 henduntur a visu apud visum. Modus tertius est situs partium
 25 rei vise adinvicem, et situs terminorum rei vise superficiei ad-
 invicem, et situs partium terminorum rei vise superficiei adin-
 vicem. Et iste modus est ordinatio. Et similiter situs visibili-
 um diversorum adinvicem collocatur sub hoc modo. Omnes
 ergo situs qui comprehenduntur a visu dividuntur in istos tres
 30 modos.

[3.95] Et situs cuiuslibet habentis situm apud alium com-
 ponitur ex remotione illius habentis situm ab illo alio et ex situ
 illius habentis situm respectu illius alterius. Oppositio ergo rei
 vise visui componitur ex remotione rei vise a visu et ex parte in
 35 qua est res visa respectu visus. Comprehensio autem remotio-
 nis rei vise iam declaratum est quod est intentio quiescens in

9 diversitas *corr. ex diversas a. m. E/quantitates: quantitas EP3R* 11 et: *ex EErP3R; per P1; corr. ex ex a. m. C1/estimationem: estimatione EErP3R/post estimationem add. estimatione L3/quantitatum (12) quantitatem Er; corr. ex quantitatem P1* 12 eorum *inter. L3* 13 modum *om. ErL3/modum huiusmodi transp. EP3R* 14 vero: ergo *C1Er/post visus scr. et del. vere C1* 16 cuiusdam *inter. a. m. E/partium: partis R* 17 *post secundus add. modus L3/superficiei rei transp. EP3* 18 *vise¹ inter. L3/ et . . . visum (19) mg. L3* 20 *ex eis mg. a. m. E/ex eis visui: visui ex eis EP3R/visui corr. ex visus S* 21 superficierum visibilium *transp. EP3* 22 spatia: spatio-
 rum R 24 apud visum *om. R/est situs transp. L3* 25 adinvicem: inter se R/et
 . . . adinvicem (26/27) *mg. a. m. S/post situs add. partium L3; rei vise superficiei: superficiei rei vise EL3P1P3R; corr. ex superficiei rei vise C1/vise² (??) S/adinvicem (26): inter se R*
 26 terminorum . . . superficiei: superficiei terminorum rei vise L3/rei vise superficiei:
 superficiei rei vise EP3R/adinvicem (27): inter se R 27 *ante et¹ add. et situs partium*
 superficiei terminorum rei vise adinvicem *C1EErP1RS (inter. a. m. S/superficiei:*
superficierum E/terminorum scr. et del. C1/adinvicem: inter se R)/similiter: consimi-
liter EP3R 28 adinvicem: inter se R 29 *post comprehenduntur scr. et del. qui*
comprehenduntur E/in: inter P3 31 alium: aliud R/componitur (32): compo-
 sitio P3 34 visui: ad visum R/visu: visui Er

anima. Verus autem locus rei vise comprehenditur ex situ rei vise apud visionem, quoniam visus non comprehendit rem visam nisi ex oppositione. Et loca que comprehenduntur a sensu comprehenduntur a distinctione, et sensus et distinctio distinguit inter loca, quamvis in eis nichil sit ex visibilibus. Et distinguit distinctio inter locum obiectum visui et locum propinquum ei, et virtus distinctiva comprehendit omnia loca per ymaginationem. Cum ergo visus fuerit oppositus alicui loco et comprehendit aliquod visibile, et visus postea fuerit ablatus ab illo loco et fuerit oppositus alii loco, destruetur visio illius rei vise. Et cum revertetur iterum ad oppositionem illius loci, revertetur illius rei vise visio.

[3.96] Et cum visus comprehenderit rem visam apud oppositionem illius in loco in quo est res visa, et comprehenderit virtus distinctiva locum oppositum visui apud comprehensionem illius rei vise, et quando visus est ablatus ab oppositione illius loci destruetur visio illius rei vise, tunc ergo virtus distinctiva comprehendet quod res visa non est nisi in parte opposita visui apud visionem illius rei vise.

[3.97] Et etiam declaratum est quod visus recipit formas proprie ex verticationibus linearum radialium et quod ipse non patitur a formis nisi ex verticationibus istarum linearum tantum. Et etiam est declaratum quod forma extenditur in corpore visus secundum rectitudinem linearum radialium. Cum ergo forma rei vise pervenerit in visum, statim sentiens sentiet formam, et sentiet partem visus in quam pervenit forma, et sentiet verticationem per quam extendetur forma in corpore membri sentientis. Cum ergo comprehenderit visus locum forme in visu et comprehenderit verticationem per quam extendebatur forma, statim virtus distinctiva comprehendet

37 *post anima add.* verus autem est locus S/verus: ubi L3P1/*post autem add.* est P1S/comprehenditur *corr.* ex comprehenduntur P1/*post situ add.* visus C1Er (*scr. et del.* C1)
 41 distinguit: distinguunt EL3R; distinguuntur P3/*in eis om.* Er; *mg. a. m.* C1
 42 distinctio: distinctionem P3 45 comprehendit: comprehenderit EP3R
 46 oppositus *om.* P3/*alii loco corr.* ex illi loco S/*visio: viso Er* 47 revertetur: reverteretur P3 48 *ante illius add.* iterum EP3R/*illius . . . visio: visio illius rei vise EP3R/vise om.* EL3P3 49 *visam om.* C1 50 illius: ipsius C1Er/comprehenderit: comprehendit C1EP3 52 *et . . . vise (53) mg. a. m.* E/*quando: cum R/est: fuerit R*
 53 destruetur: destruitur EP3R 54 comprehendet: comprehendit P1S/*visa corr.* ex via P3 55 *post illius scr. et del.* s S 56 *etiam om.* P1S/*recipit alter. ex respicit in resipit Er* 57 *ipse corr.* ex ipsa P1 59 *est declaratum: declaratur C1Er; transp.* EP3R 63 *per quam: postquam C1Er/extendetur: extenditur EP3R/in . . . forma (66) mg. a. m.* S 64 comprehenderit: comprehenderet Er 65 comprehenderit: comprehendet EP3; comprehenderet L3 66 *post extendebatur add.* illa R/*forma . . . illa (67) mg. a. m.* E/*comprehendet: comprehendit P1S*

locum in quem ex quo per quem extendebatur illa verticatio. Locus autem per quem ex quo extenditur illa verticatio est locus in quo est illa res visa. Ex comprehensione ergo partis
 70 visus in qua pervenit forma rei vise, et ex comprehensione verticationis per quam extendebatur forma et ex qua patitur visus a forma comprehendit virtus distinctiva verticationem per quam extendebatur forma rei vise secundum veritatem. Et secundum hunc modum distinguuntur loca visibilium, quoniam
 75 visibilia distincta non distinguuntur a visu nisi ex distinctione locorum in superficie distinctorum membri sentientis ad que perveniunt forme visibilium distinctorum.

[3.98] Et comprehensio loci rei vise secundum hunc modum habet simile in auditu, quoniam sentiens comprehendit vocem
 80 per sensum auditus, et comprehendit locum a quo venit vox, et distinguit inter vocem venientem a dextra et vocem venientem a sinistra, et ab ante et retro. Immo distinguit etiam inter loca vocum distinctione subtiliori ista, et distinguit inter locum vocis venientis a loco sibi opposito facilius et locum vocis venientis a loco obliquo a verticatione oppositionis. Et non distinguuntur a sentienti loca ex quibus veniunt voces respectu auditus nisi per verticationes super quas veniunt voces ad auditum. Sensus ergo auditus comprehendit voces, et comprehendit verticationes ex quibus veniunt voces, et ex comprehensio-
 90 ne verticationum super quas veniunt voces ad auditum et super quarum rectitudinem percutit vox auditum comprehendit virtus distinctiva locum a quo venit vox. Sicut ergo loca vocum comprehenduntur a sensu auditus, deinde a virtute distinctiva mediante auditu, ita loca visibilium comprehenduntur
 95 a virtute distinctiva per sensum visus.

[3.99] Et ex illis ex quibus declaratur quod sentiens comprehendit verticationem secundum quam patitur visus a forma rei vise est illud quod comprehenditur in speculis secundum reflexionem, quoniam res visa quam quidem comprehendit

67 *post quo add. et R* 68 *locus corr. ex locum C1/per quem scr. et del. C1/post quem add. et R/ex quo inter. a. m. E/extenditur: extendetur EP3R* 70 *visus corr. ex visis S/qua: quam R/ex om. P3* 73 *secundum veritatem inter. L3/veritatem: verticatem S; corr. ex verticationem 1* 76 *in . . . distinctorum: distinctorum in superficie EP3R*
 80 *venit: per-venit P1S* 82 *ab om. R/post et² add. a C1Er/retro: recto P1* 84 *faciliter: facialiter ER; corr. ex facialiter P3* 85 *oppositionis: oppositis Er/distinguuntur (86): distinguit P3* 86 *ante a inter. scilicet EP3 (a. m. E)/a sentienti inter. EP3 (a. m. E); om. R/sentienti: sentiente EP3/ex: a EP3R/veniunt: venient L3* 88 *post ergo scr. et del. ad P3* 89 *et om. L3* 90 *verticationum corr. ex verticatio P3* 91 *percutit corr. ex percillit P3; corr. ex percudit a. m. E* 92 *post distinctiva scr. et del. i S*
 94 *comprehenduntur . . . distinctiva (95) mg. a. m. S* 96 *declaratur corr. ex delectatur a. m. E/quod: quoniam EL3P3* 97 *quam: quod EP3R* 99 *quidem om. C1EErP3R*

- 100 visus secundum reflexionem non comprehenditur a visu nisi in
 oppositione et cum est opposita illi. Sed forma eius pervenit
 ad visum secundum linearum rectarum verticationes que sunt
 linee radiales extense a visu in partem oppositionis. Cum ergo
 visus senserit formam ex verticationibus linearum radialium,
 105 existimabit rem visam esse apud extremitates illarum linearum,
 quoniam nichil comprehendet ex visibilibus assuetis que sem-
 per comprehendit nisi apud extremitates linearum ymagi-
 natarum inter visum et rem visam, que sunt linee radiales. Ex
 comprehensione ergo rei vise a visu secundum conversionem in
 110 visus oppositionem et secundum rectitudinem verticationum
 super quas forme reflexe perveniunt ad visum, videbitur quod
 sentiens sentit verticationem per quam venit forma et ex qua
 patitur visus a forma. Et cum sentiens sentit verticationem ex
 qua patitur a forma, comprehendit virtus distinctiva locum in
 115 quo extenditur illa verticatio, et comprehendet locum rei vise.
 Locus ergo rei vise comprehenditur a sentiente comprehensione
 larga ex comprehensione situs apud visionem, et comprehen-
 detur a virtute distinctiva larga comprehensione ex compre-
 hensione situs rei vise apud visionem, et comprehenditur vera
 120 comprehensione certificata ex comprehensione verticationis ex
 qua patitur visus a forma rei vise. Remotio autem rei vise est
 intentio que iam quievit in anima. Igitur apud perventum rei
 vise ad visum comprehendit virtus distinctiva locum rei vise
 cum quiete intentionis remotionis apud ipsam. Et adiunctio
 125 remotionis et loci est oppositio. Cum ergo virtus distinctiva
 comprehenderit locum rei vise et suam remotionem in simul,
 comprehendet eius oppositionem. Comprehensio ergo opposi-
 tionis est ex comprehensione loci rei vise et comprehensione

102 linearum . . . verticationes: verticationes . . . rectarum C1Er/post linearum scr. et del.
 rectitudinem S 106 quoniam . . . linearum (107) mg. L3/comprehendet: comprehen-
 dit PIRS 107 nisi: a visu Er; corr. ex a visu a. m. C1; corr. ex verus P3 109 ergo:
 igitur C1/conversionem: reflexionem R/in om. EP3R 110 post visus add. ad EP3
 111 perveniunt: proveniunt EP3 112 per . . . et inter. L3/per . . . verticationem (113)
 mg. a. m. S 113 visus inter. a. m. L3/a om. L3/et . . . forma (114) inter. L3/sentit:
 senserit L3/ante ex add. visus EP3R; add. per quam venit forma et P1 114 post
 patitur add. visus EP1P3R; mg. visus a a. m. C1/a om. ErL3S/post forma add. et P1/
 comprehendit: comprehendet C1Er/in: ex P3; alter. in ex a. m. C1 116 comprehenditur:
 comprehendetur R/sentiente corr. ex senti P3 117 post larga add. et C1EErP3R/ex
 om. Er; inter. a. m. C1 118 larga comprehensione transp. R 119 comprehenditur:
 comprehendetur EL3P1P3RS 120 ante certificata inter. et a. m. C1 121 post vise²
 scr. et del. ad visum S 122 perventum: punctum EErL3P3; corr. ex punctum C1
 125 virtus corr. ex visus P3 126 comprehenderit: comprehendit Er/et corr. ex ad S/
 in om. R/post simul add. etiam L3 127 oppositionem: oppositum EP3/ergo: autem
 C1 (inter. a. m.); mg. a. m. Er 128 post vise scr. et del. et comprehensione rei vise Er/
 et . . . visi (129) om. Er/post et add. ex EP3R/comprehensione²: comprehensio L3

remotionis rei vise in simul, et comprehensio loci erit secun-
 130 dum modum quem diximus. Cum ergo forma rei vise pervenerit
 in visum, sentiet sentiens locum membri sentientis in quem per-
 venit forma, et comprehendit virtus distinctiva locum rei vise
 ex verticatione per quam extenditur forma. Et intentio remoti-
 onis iam quietata est apud ipsam. Ipsa ergo comprehendit lo-
 135 cum et remotionem in simul apud comprehensionem forme a
 sentienti. Igitur apud comprehensionem forme a sentienti com-
 prehendet virtus distinctiva oppositionem. Secundum ergo
 hunc modum dictum erit comprehensio oppositionis.

[3.100] Et iam declaratum est quomodo visus comprehen-
 140 dit formam rei vise solo sensu. Apud ergo proventum forme
 rei vise in visu comprehendet sentiens colorem rei vise, et lu-
 cem eius, et locum visus qui colorabatur et illuminabatur ab illa
 forma. Et comprehendet virtus distinctiva locum eius, et re-
 motionem apud comprehensionem lucis et coloris eius a senti-
 145 ente. Et sic comprehenduntur lux et color, locus et remotio
 simul, scilicet in minimo tempore. Sed locus et remotio sunt
 oppositio, et lux et color sunt forma rei vise, et ex comprehen-
 sione forme cum comprehensione oppositionis sustentatur
 comprehensio rei vise in oppositione visus. Ergo comprehensio
 150 rei vise in oppositione visus non est nisi quia forma et opposi-
 tio comprehenduntur simul. Deinde propter frequentationem
 istius intentionis et multitudinem iterationis eius est facta for-
 ma signum sensui et virtuti distinctive. Apud ergo forme pro-
 ventum in visu comprehenditur a sentiente, et comprehendit
 155 virtus distinctiva oppositionem, et efficitur ex hoc ab ipso
 sentiente quidem comprehensio rei vise in suo loco. Secundum
 ergo hunc modum erit comprehensio rei vise in suo loco, et

129 remotionis *om.* C1Er/post et *scr. et del.* ex E/comprehensio *corr.* ex comprehen-
 sione L3 132 post forma *scr. et del.* et P1/comprehendit: comprehendet C1Er

133 quam: quem P3/extenditur: extendetur S 134 iam *corr.* ex in a. m. E/ergo *corr.*
 ex autem S/comprehendit: comprehendet EP3R 135 et: est Er/in *om.* C1ErR

136 sentienti^{1,2}: sentiente R 138 dictum *om.* C1Er 139 est *om.* L3/comprehendit
 (140): comprehendet Er; comprehendat R 140 ergo proventum: perventum ergo R

141 visu: visum R 142 post eius *add.* et locum eius P3 143 comprehendet:
 comprehendit C1Er 144 eius *om.* Er; *corr.* ex est a. m. C1 145 post color *add.* et
 C1Er/post remotio *add.* in EL3P3 146 scilicet *om.* EP3R/sed *corr.* ex si a. m. S

147 oppositio: opposita EP3R 148 cum: et EP3R/post comprehensione *scr. et del.*
 forme cum comprehensione P1 150 post visus *scr. et del.* ergo comprehensio rei

vise S 151 ante simul *add.* in EP3 152 istius *corr.* ex ipsius C1/iterationis:
 interdictionis Er; *corr.* ex interdictionis a. m. C1 153 ergo . . . proventum (154):

perventum . . . forme R/forme *om.* EP3/forme proventum (154) *transp.* C1Er
 154 visu: visum R 155 ab . . . quidem (156) *om.* C1Er 156 quidem *om.* R/suo

loco *transp.* P3/post loco *add.* et similiter de qualibet partium rei vise EP3R (partium:
 parte R) 157 suo loco *transp.* EP3

similiter de qualibet partium rei vise.

[3.101] Cum ergo remotio rei vise fuerit ex remotionibus
 160 mediocribus certificate quantitatis, erit locus rei vise in quo
 comprehenditur a visu locus verus. Et si remotio rei vise non
 fuerit ex remotionibus certificate mensure, erit comprehensio
 rei vise in oppositione certificata secundum oppositiones, quo-
 niam oppositio componitur ex ubi et remotione in eo quod
 165 remotio. Sed locus rei vise in quo comprehenditur a visu est
 estimatus, non certificatus, quoniam locus certificatus non
 comprehenditur nisi ex certificatione quantitatis remotionis.

[3.102] Situs vero superficierum visibilium apud visum
 dividuntur in duo: scilicet in directam oppositionem et obli-
 170 quationem. Superficies autem directa opposita visui est illa
 que, quando comprehenditur a visu apud rectam oppositio-
 nem, occurret axis radialis alicui puncto ex ea, et cum hoc erit
 axis elevata super superficiem elevatione equali. Et superficies
 obliquata est illa que, quando comprehenditur a visu apud
 175 obliquationem et occurrerit axis radialis alicui puncto ex ea,
 erit obliquata super superficiem non elevata super ipsam ele-
 vatione equali secundum omnes diversitates modorum obli-
 quationis.

[3.103] Termini vero superficierum visibilium, et linee que
 180 sunt in rebus, et spatia que sunt inter visibilia et inter partes
 visibilium dividuntur in duo quorum alterum est linee et spa-
 tia secantia lineas radiales et alterum est linee et spatia equidis-
 tantia lineis radialibus respicientia ipsas. Et linee et spatia
 secantia lineas radiales dividuntur secundum situm in duo, in
 185 obliquationem et directionem secundum divisionem situum et
 superficierum in ista duo. Linea autem directa est illa ad cuius

158 partium: parte R 161 verus: eius P1S 164 post oppositio scr. et del. oppo
 P3; scr. et del. n S/ubi: ubitate R/post quod add. est C1ErR 165 post locus scr. et del.
 remotio S 166 locus certificatus transp. P1/post locus add. non P3 168 post
 visibilium add. etiam EP3 169 dividuntur: dividitur EP3R 170 superficies:
 superficierum EP3 171 que: cuius axis radialis R; post quando add. superficies R/
 a visu om. P1/oppositionem (172) corr. ex visionem P1 172 occurret: occurrat C1;
 occurrat EL3P3R /axis radialis om. R/alicui: objecto P1S/cum ... elevata (173): est simul
 elevatus R 173 elevata: elevationis EP3/super inter. S/post superficies scr. et del.
 eq P1 174 que: cuius axis radialis R/post quando add. ipsa R/comprehenditur corr.
 ex comprehenduntur P1 175 obliquationem corr. ex obliquationis P1/et om. R/
 occurrerit: occurrat P3/axis radialis om. R 176 erit: et est R/obliquata om. P1;
 obliquatus P3R; corr. ex obliquatus a. m. E/super¹ inter. L3/elevata: elevatus PIP3R;
 corr. ex elevatus a. m. E; corr. ex elevatam L3/super ipsam om. P3; mg. a. m. E 180 post
 rebus add. visibilibus C1Er 181 visibilium corr. ex visibilium E/post visibilium scr.
 et del. et linee que sunt in rebus et secundum P1/est: sunt R/post spatia scr. et del.
 equidistantia L3 182 est: sunt R 184 secantia mg. P3; alter. in secantes a. m. E/
 secundum situm om. P1; inter. a. m. S 185 et² om. ErS

aliquod punctum perveniet axis radialis, et erit perpendicularis super ipsam, et linea obliquata est illa que, quando axis radialis venerit ad aliquod punctum eius, erit obliquatus super
 190 ipsum, non perpendicularis.

[3.104] Visus autem comprehendit obliquationem superficierum et linearum, et directionem earum, ex comprehensione diversitatis remotionum extremitatum superficierum et linearum et equalitatis earum. Quoniam quando visus comprehen-
 195 derit superficiem rei vise, et comprehenderit remotiones extremitatum eius, et senserit equalitatem remotionum terminorum superficiei ab eo, aut equalitatem remotionum duorum locorum oppositorum equalis remotionis a loco superficiei ad quam intuetur quis, comprehendet superficiem esse directe
 200 oppositam, et iudicabit virtus distinctiva quod sit directa. Et cum visus comprehenderit superficiem rei vise, et comprehenderit remotionum extremitatum eius diversitatem, et non invenerit in superficie duo loca equalis remotionis a loco superficiei ad quam intuetur quorum remotio ab eo fuerit equalis,
 205 comprehendet superficiem obliquatam in respectu eius, et iudicabit virtus distinctiva quod sit obliquata.

[3.105] Et similiter de sitibus linearum et spatiorum directorum et obliquatorum; scilicet quod visus comprehendit directionem lineae et spatii quando senserit quod due remotiones
 210 duarum extremitatum lineae aut spatii ab eo sunt equales, aut quod due remotiones duorum punctorum lineae aut spatii quorum remotio a puncto ad quem intuetur quis (puncto scilicet lineae aut spatii) est equalis ab eo sunt equales. Et comprehen-

187 perveniet: pervenit *Er* 188 quando . . . radialis (189): axis . . . quando *R/post* quando *scr. et del. q P1; add. cuius R/post axis scr. et del. radi S* 189 venerit: pervenerit *C1ErR* 190 ipsum: ipsam *EP3R; alter. in ipsam L3* 191 post comprehendit *add. directionem et R* 192 directionem: distractionem *E*; distinctionem *P3R/post earum add. et S* 193 remotionum: remotionem *Er/extremitatum corr. ex extremitatem C1* 194 equalitatis: equalium *P1* 195 superficiem . . . comprehenderit *om. L3* 196 post remotionum *scr. et del. duorum locorum oppositorum P3/terminorum (197) om. ErL3S; inter. a. m. C1* 197 superficiei . . . remotionum *om. L3S/equalitatem corr. ex essentialitatem a. m. E; remotionum om. R* 199 quam: quem *P3* 200 oppositam *corr. ex oppositum a. m. C1/directa: recta C1EErL3P3* 201 rei vise *om. P1S; inter. a. m. E* 202 remotionum: remotionem *EErP3R/post eius add. et EP3R* 204 eo: ea *C1EErL3P3/equalis corr. ex inequalis C1Er* 205 post superficiem *add. esse C1Er/eius: sui R* 207 post sitibus *scr. et del. earum P1/spatiorum corr. ex spatium L3* 208 obliquatorum: obliquorum *P3R/comprehendit: comprehendet EL3P3; comprehendat R* 210 ab . . . equales: sunt equales ab eo *EP3R/aut² . . . equales (213) om. S* 212 quem: quod *R/intuetur: intuitur EP3/puncto . . . quis (217) mg. a. m. E* 213 spatii *corr. ex spatio Er/est . . . eo om. C1Er; inter. L3/ab eo om. EP1P3R/sunt equales om. R/post equales add. remotiones ille EP3; add. scilicet ille remotiones P1/comprehendit (214): comprehenderit P3*

dit obliquationem lineae aut spatii quando senserit quod due
 215 remotiones duarum extremitatum lineae aut spatii ab eo, aut
 quod due remotiones duorum punctorum equalis remotionis a
 puncto ad quem intuetur quis lineae aut spatii sunt diverse. Et
 ista equalitas et diversitas multotiens comprehenduntur a sen-
 220 tiente per estimationem et per signa. Secundum ergo hunc mo-
 dum erit obliquationis comprehensio et directionis a visu.

[3.106] Et cum superficies tota aut linea tota fuerit directa
 visui, non erit quilibet pars eius per se directe opposita visui.
 Immo nulla pars eius est directe opposita visui per se nisi pars
 supra quam est axis apud directam oppositionem. Cum ergo
 225 movetur axis radialis super superficiem directam aut super
 lineam directam, quilibet pars per quam transit axis erit axis
 obliquatus super ipsam preter primam partem in qua est
 punctus super quem fuit axis perpendicularis. Et sic erit que-
 libet pars superficiei directe opposite et lineae directe opposite
 230 quando fuerit sumpta per se obliquata preter partem predic-
 tam. Et quando accipietur tota superficies aut tota linea, erit
 tota directa. Et cum punctus apud quem erit axis perpendicu-
 laris super superficiem aut lineam fuerit in medio superficiei
 aut lineae, erit superficies aut linea in fine directe oppositionis
 235 visui. Si autem punctus non fuerit in medio, erit superficies
 aut linea directa, sed non in fine directionis; et quanto magis
 punctus ad quem axis fuerit perpendicularis super superficiem
 aut lineam fuerit medio superficiei propinquior aut lineae, tanto
 magis erit superficies aut linea maioris directe oppositionis.

240 [3.107] Situs autem linearum et spatiorum equidistantium

214 ante obliquationem *add.* visus *R/aut:* et *Er/post* spatii *scr. et del.* et comprehendit
 obliquationem lineae aut *S/post* senserit *scr. et del.* remotiones *P3/senserit* quod *rep. P1*
 215 post duarum *scr. et del. re P3/post* eo *add.* sunt inaequales *R* 216 post punctorum
add. et EP3R/a puncto (217) *om. P3* 217 quem: quam *P3*; quod *R/intuetur:* intu-
 itur *P3* 218 et: aut *EP3/et* diversitas *om. L3/comprehenduntur alter. ex*
comprehendunt in comprehenditur L3 219 per² *om. EL3P3R/post* secundum *add.*
conclusio E/ergo om. P3 220 obliquationis comprehensio *transp. C1Er* 221 cum
inter. a. m. Er/post tota² *add. linea S* 222 quilibet pars *transp. L3/visui*² ... opposita
 (223) *om. L3* 223 nulla: nullo *Er/est:* fuerit *R* 224 supra: super *Er* 225 aut
 ... directam (226) *mg. a. m. L3* 226 quilibet ... ipsam (227): erit obliquatus super
 quamlibet ipsius partem supra quam transit *R/pars inter. L3/per:* super *EP3*
 228 quem: quod *ErR*; *corr. ex* quod *C1/fuit* axis: fuerit *R* 230 predictam (231)
om. P3 231 tota¹ ... linea: tota linea aut superficies *R* 232 tota *om. R/tota* directa
transp. EP3/punctus: punctum *R/quem:* quod *R* 235 visui: ad visum *R/punctus:*
 punctum *R/non* fuerit *transp. L3* 236 magis *om. R/post* magis *add. fuerit EP3R*
 237 punctus ad quem: punctum apud quod *R* 238 fuerit: fuit *L3/om. R/post* fuerit
add. in EL3P1P3 (scr. et del. L3)/propinquior aut lineae: aut lineae propinquius *R*
 239 magis *om. R/erit:* erunt *C1ErL3S/erit* superficies *transp. P1/maioris* directe:
 directioris *R*

radialibus lineis comprehenduntur a visu ex comprehensione
 oppositionis. Quoniam quando visus comprehenderit extremi-
 tates linearum aut spatiorum que sequuntur et vicinantur visi-
 bilia opposita illi et extremitates eorum propinquas que sequ-
 untur eundem visum, comprehendet situs eorum, et compre-
 hendet extensionem eorum in verticatione oppositionis.

[3.108] Secundum ergo istos modos erit comprehensio situ-
 um superficierum linearum et spatiorum a visu respectu illius.

[3.109] Quedam autem superficies, et lineae, et spatia se-
 cantia lineas radiales sunt valde magne obliquationis super
 radiales lineas, et quaedam sunt modice, et quaedam sunt per-
 pendiculares super lineas radiales, et sunt superficies et lineae
 et spatia directe opposita visui. Extremitas autem remotior
 cuiuslibet superficierum et linearum et spatiorum maxime obli-
 quationis super lineas radiales sequitur partem remotam a
 visu, scilicet partem sequentem extremitates linearum radiali-
 um. Et extremitas propinquior sequitur partem propinquam
 visui, scilicet partem sequentem visum. Et quando visus com-
 preenderit aliquam lineam vel aliquod spatium, statim com-
 prehendit duo ubi sequentia extremitates illius lineae aut illius
 spatii. Et similiter, quando visus comprehenderit aliquam
 superficiem, comprehendit ubitates sequentes extremitates
 illius superficierum ex comprehensione extensionis illius super-
 ficiei in longitudine et latitudine. Cum ergo visus comprehen-
 derit superficiem obliquam super lineas radiales, et fuerit illa
 superficies maxime declinationis, comprehendit ubitatem
 visus sequentem extremitatem remotiorem apud comprehen-
 sionem superficierum, et comprehendit ipsam esse sequentem
 extremitates linearum radialium, et comprehendit ubitatem
 sequentem extremitatem propinquiorem, et comprehendit

241 radialibus lineis *transp.* EP3R 243 aut: et C1Er/et: etiam P3; *inter.* C1ErL3 (*a. m.*
 C1Er)/et vicinantur *om.* R 244 *post* opposita *add.* visui R/illi *inter.* *a. m.* E/*post* illi
add. visui E/*post* eorum *scr.* et *del.* que P3 245 comprehendit¹ *corr.* ex comprehen-
 deret S 248 *post* superficierum *add.* et C1Er 250 valde magne *transp.* L3/valde
 ... obliquationis: obliquationis ... magne R/*post* valde *scr.* et *del.* n C1 251 et¹ ...
 radiales (252) *mg.* *a. m.* S 252 lineas radiales *transp.* L3 253 extremitas *corr.* ex
 extremitates P3 254 superficierum: superficierum R/linearum: lineae R/spatiorum:
 spatii R/maxime ... radiales (255) *om.* R 257 extremitas *corr.* ex extremitates P1
 258 comprehendit (259): comprehendit EP3 260 duo ... sequentia: duas ubitates
 sequentes R/illius lineae *transp.* EP3 261 *post* similiter *scr.* et *del.* ? S/comprehenderit:
 comprehendit EP3/aliquam: aliquem P1S 262 ubitates *corr.* ex veritates L3
 266 ubitatem *corr.* ex veritatem L3/ubitatem visus (267) *transp.* ER 267 visus *om.*
 P3/*post* sequentem *add.* ubitatem P3 269 extremitates *corr.* ex extremitatem L3/
 ubitatem *corr.* ex veritatem ErL3 270 propinquiorem: remotiorem Er; *corr.* ex
 remotiorem *a. m.* C1

ipsam esse sequentem illud quod est prope visum; et similiter de linea et spatio maxime obliquationis. Et cum visus per-
ceperit quod una duarum extremitatum superficiei, aut lineae,
aut spatii sequitur ubitatem remotam a visu, et quod altera
275 extremitas sequitur ubitatem propinquam visui, statim per-
cipiet remotionem unius duarum extremitatum illius super-
ficiei, aut lineae, aut spatii, et appropinquationem alterius. Et
cum perceperit remotionem unius duarum extremitatum, aut
lineae, aut spatii, aut superficiei, et appropinquationem alteri-
280 us, statim percipiet obliquationem situs illius superficiei, aut
lineae aut spatii. Obliquatio ergo superficierum, et linearum, et
spatiorum obliquatorum super lineas radiales extraneae obli-
quationis comprehenditur a visu ex comprehensione duarum
ubitatum extremitatum eorum.

285 [3.110] Declinatio autem et directa oppositio linearum, et
superficierum, et spatiorum modice obliquationis et directorum
visui non comprehenduntur a visu vera comprehensione certifi-
cata nisi remotio eorum sit mediocris et respiciens corpora
ordinata comprehensa a visu. Et comprehenderit ex mensuris
290 eorum corporum mensuras remotionum extremitatum illarum
superficierum, et linearum, et spatiorum, et comprehenderit
equalitatem duarum remotionum duarum extremitatum super-
ficiei, aut lineae, aut spatii aut inequalitatem earum. Quoniam
nulla ubitatum sequentium extremitates superficierum, et line-
295 arum, et spatiorum directe oppositorum aut declinantium
modica declinatione est sequens visum; sed extremitates eo-
rum opposite sequuntur ubitates dextras et sinistras, aut
superiores, aut inferiores. Si ergo visus non comprehenderit
mensuras remotionum illius quod est huiusmodi a visu, non

271 illud: aliud *Er* 272 perceperit (273): percepit *P1* 274 sequitur: sequuntur
EP3; sequetur *L3*; sequantur *R*/ubitatem *corr. ex veritatem L3*/altera extremitas (275)
transp. L3 275 sequitur: sequatur *R*/ubitatem *corr. ex veritatem L3*/percipiet (276):
perciperet *C1S*/percipiet remotionem (276) *transp. S* 276 post remotionem *scr. et del.*
d C1/extremitatum *corr. ex extremitatem L3*/illius superficiei (277) *om. R* 277 post
spatii *add. aut superficiei R*/et¹ *inter. a. m. S*/appropinquationem: propinquiorem *P3*;
corr. ex propinquationem a. m. S/alterius *om. P3* 278 perceperit: percepit *L3*; *corr. ex*
comperit EP3 (a. m. E)/unius *om. C1Er*; *inter. L3* 279 appropinquationem:
propinquationem *L3* 280 ante statim *add. et C1S*; *mg. et*² (277) . . . alteri-
us (279/280) *S* 283 ex *om. L3* 284 ubitatum *corr. ex veritatem L3* 286 et²
. . . comprehensione (287) *mg. a. m. S*/directorum visui (287): directionis *R* 287 post
comprehensione *scr. et del. et S* 288 eorum: earum *C1*/respiciens: respiciat *R*
289 post et *add. nisi S* 291 post et² *scr. et del. remo L3*; *scr. et del. superfc P3*
292 equalitatem: equalitatum *Er*; *corr. ex equalitatum a. m. C1* 295 oppositorum:
oppositarum *EP3* 296 est sequens: sequitur *R* 297 et: aut *EL3P3R* 299 illius
. . . est: eorum quae sunt *R*/post est *scr. et del. est S*

- 300 comprehendet diversitatem et inequalitatem remotionum
extremitatum eorum oppositorum aut equalitatem eorum. Et
cum hoc non comprehenderit, non comprehendet obliquatio-
nem eorum nec directionem. Cum ergo superficies, et lineae, et
spatia fuerint maxime remotionis, et fuerit obliquatio eorum
5 modica, non poterit visus comprehendere eorum obliquatio-
nem, nec poterit distinguere inter obliquum et rectum, quoniam
quantitates remotionum superficierum, et linearum, et spati-
orum quorum remotio est maxima non certificantur a visu, sed
existimantur. Et quando remotio eorum fuerit magna, et fuerit
10 cum hoc obliquationis modice, erit differentia que est inter
remotiones extremitatum eorum oppositorum valde modica,
fere carens quantitate respectu quantitatum remotionum eo-
rum. Et cum visus non certificaverit quantitates remotionum
extremitatum eorum, non comprehendet diversitatem que est
15 inter remotionem extremitatum eorum. Et cum non compre-
henderit diversitatem que est inter remotiones extremitatum
superficiei, et lineae, et spatii, existimabit remotiones illas esse
equales, et non comprehendet obliquationem illius superficiei,
aut lineae, aut spatii. Et cum non comprehenderit obliquatio-
20 nem illius superficiei, aut lineae, aut spatii, existimabit ipsum
esse directum. Et obliquatio superficierum, et linearum, et
spatiorum quorum remotio est maxima non comprehendetur a
visu quando fuerit modica. Visus ergo comprehendit omnes
superficies, et lineas, et spatia que sunt maxime remotionis et
25 minime obliquationis quasi directe oppositas, et non certificat

300 comprehendet *corr. ex* comprehendit P3/diversitatem *om. R/et om. C1EErP3R/*
inequalitatem: inequalitatum C1EErP3; *corr. ex* equalitatem S 1 extremitatum *om.*
EP3/oppositorum *om. R/equalitatem: inequalitatem P1/eorum om. R* 2 cum hoc:
si haec R/post hoc *scr. et del. non* comprehere P3 3 et² *om. S* 4 fuerint: sunt L3/
post fuerint *scr. et del. m S/fuerit corr. ex* fuerint P3 5 eorum obliquationem (6)
transp. C1EEr 6 quoniam: quam Er/quoniam quantitates (7) *corr. ex* quam qualitates
a. m. C1 7 remotionum *om. L3S* 8 maxima: magna ER 9 quando: cum
EP3R/eorum fuerit *transp. S/fuerit¹: fuit P1/magna: maxima C1Er/fuerit cum hoc* (10):
fuerint ipsa R 10 obliquationis: obligationis L3/obliquationis modice *transp. R/*
que est: quoque S; *corr. ex* quoque L3 11 remotiones extremitatum: remotas
extremitates EP3R 12 remotionum: remotionis L3/ eorum (13): earum C1Er
13 non . . . cum (19) *mg. a. m. S* 14 non . . . eorum (15) *mg. a. m. E/ante que add.*
remotionum R/que . . . remotionem (15): remotionem que est inter EP3 15 re-
motionem *om. R/remotionem extremitatum transp. C1/extremitatum: extremitates*
EP3R/eorum *om. P3/post et scr. et del. non* P1 16 remotiones: extremitates P3
17 superficiei: superficierum EP3/et¹ *om. C1EL3R* 18 comprehendet: comprehen-
dit C1ErL3 19 et . . . spatii (20) *om. P3* 20 illius *om. C1Er* 22 com-
prehendetur: comprehenditur R 23 quando . . . modica *om. R/post ergo scr. et del.*
non Er/comprehendit: comprehendet EP3/ante omnes *scr. et del. o C1* 24 sunt
inter. L3 25 obliquationis *corr. ex* obliquationes Er/ante quasi *scr. et del. et C1/*
oppositas: oppositionis P3; opposita R

situs eorum nec distinguit inter obliquum et directe oppositum, sed comprehendit obliquum et directum secundum unum modum.

[3.111] Et similiter situs superficierum et linearum et spatiorum quorum remotio est mediocris, quando non fuerit respiciens corpora ordinata, aut visus non comprehenderit corpora respicientia remotiones eorum, et non certificaverit quantitates remotionum eorum, tunc situs, scilicet, non certificatur a visu. Nec distinguit visus inter obliquum eorum et directum, sed accipit situm eorum estimatione, et fortasse existimabit illud quod est huiusmodi esse directum, quamvis sit obliquum. Et cum superficies, et lineae, et spatia fuerint in remotione mediocri, et remotiones eorum fuerint respicientes corpora ordinata, et comprehenderit visus illa corpora et quantitates eorum, comprehendet quantitates remotionum extremitatum illarum superficierum, et linearum, et spatiorum. Et comprehendet equalitatem remotionum extremitatum eorum oppositorum, si fuerint extremitates ille equales, et inequalitatem eorum, si fuerint inequales. Et cum comprehenderit equalitatem remotionum extremitatum superficierum, aut lineae, aut spatii, aut inequalitatem eorum, comprehendet directionem illius superficierum, aut lineae, aut spatii, aut eorum obliquationem certificata comprehensione.

[3.112] Et similiter obliquatio linearum, aut superficierum, aut spatiorum que sunt maxime obliquationis non comprehenditur a visu nisi sint in remotione mediocri respectu magnitudinis eorum. Nam visus non comprehendit ubitates sequentes extremitates superficierum, aut lineae, aut spatii nisi quando comprehenderit qualitatem extensionis illius superficierum, aut lineae, aut spatii. Sed visus non comprehendit qualitatem extensionis superficierum, aut lineae, aut spatii nisi quando fuerit in remotione

26 eorum om. P1 27 directum: rectum EP3R/unum modum (28) transp. C1Er
 29 similiter situs transp. C1Er 30 fuerit: fuit L3/fuerit respiciens (31) respexerit R
 31 comprehenderit: comprehendit P3 32 respicientia corr. ex rei E 33 tunc situs
 scilicet om. R/post visu scr. et del. scilicet non P1 34 distinguit visus transp. C1Er
 35 estimatione corr. ex estimative C1/estimabit: estimabitur P3; corr. ex estimabat S
 37 et^l om. L3/mediocri (38) corr. ex modica L3 38 fuerint respicientes: respexerint
 R/ordinata corr. ex coordinata P3 39 post corpora add. ordinata EP3R/quantitates:
 quantitas P1S 40 illarum . . . extremitatum (42) mg. L3/illarum superficierum (41)
 transp. EP3R 41 comprehendet: comprehendit L3 43 ille om. P1 44 equali-
 tatem mg. a. m. C1 45 superficierum: superficierum R; corr. ex superficierum EP3 (a. m.
 E)/lineae: linearum R/spatii: spatiorum R 47 post certificata scr. et del. obliqua P1
 50 comprehenditur (51): comprehenduntur EP3 51 post nisi add. ipsa R/sint:
 fuerit C1 52 visus: virtus L3 53 quando om. Er 54 qualitatem: quantitatem
 R; corr. ex quantitatem a. m. EP3 55 sed . . . spatii (56) mg. L3/qualitatem: quanti-
 tatem R 56 fuerit om. P1

mediocri respectu quantitatis illius superficiei, aut lineae, aut spatii. Declinatio ergo superficiei, aut lineae, aut spatii secantium lineas radiales, quando fuerit maxima, comprehendetur a visu ex comprehensione ubitatum extremitatum eius. Et si fuerit modice obliquationis aut directe oppositionis, comprehendetur a visu esse obliquum aut esse directum ex comprehensione quantitatum remotio-
60 num extremitatum eorum oppositorum. Et visus non certificat qualitatem situum superficierum, et linearum, et spatiorum que sunt maxime obliquationis nisi quando certificaverit qualitatem extensionis eorum, et non certificat situm superficierum, et linearum, et spatiorum que sunt modice obliquationis aut directe oppositorum nisi quando certificaverit quantitates remotio-
70 num extremitatum eorum, et comprehenderit inequalitatem remotio- num extremitatum eorum oppositorum aut equalitatem earum. Sed visus raro certificat situs visibilium. Et plura que comprehendit visus ex sitibus visibilium non comprehendit nisi per estimationem. Sustenatio ergo visus in comprehensione situum
75 visibilium non est nisi secundum estimationem. Cum ergo aspiciens aspexerit et voluerit certificare situm alicuius superficiei, aut situm alicuius linearum que sunt in visibilibus, aut situm alicuius spatiorum que sunt in superficiebus visibilium, intuebitur formam illius rei vise et qualitatem extensionis illius superficiei, aut lineae, aut spatii. Si ergo forma illius rei vise in qua est illa superficies, aut linea, aut spatium fuerit manifesta certificata, et fuerit obliquatio illius superficiei, aut lineae, aut spatii maxima, comprehendet visus obliquationem eius vere ex comprehensione qualitatis extensionis eius et ex comprehen-
85 sione duarum ubitatum extremitatum eius oppositorum. Et si forma illius rei vise fuerit manifesta, et non fuerit maxime obliquationis, et remotio eius fuerit respiciens corpora ordinata, videbit corpora respicientia remotiones extremitatum eius, et

58 declinatio: declaratio EP3/post ergo scr. et del. remotio P1/secantium (59): sequan-
tium P3 59 post lineas add. aut P3 60 ex om. EP3R 62 post directum add.
visibile R 64 oppositorum om. R 65 ante que scr. et del. maximum S 68 op-
positorum (69): oppositionis R 69 quando: ante P1S 70 post extremitatum add.
remotionum P1S 71 oppositorum: oppositarum C1EErP3/earum om. R
75 secundum: per EL3P3R 76 ante aspexerit scr. et del. pot P1/aspexerit et om. C1Er
77 situm: situs S/linearum: lineae R 78 situm om. S/spatiorum: spatii R/que sunt
om. R 81 illa superficies transp. L3/post aut¹ scr. et del. au P3 82 illius: istius E
83 post visus scr. et del. vis Er 84 qualitatis corr. ex qualitate P1 85 oppositorum:
oppositarum C1EErL3P3; om. R; corr. ex oppositum S 86 post vise add. que
comprehenderit L3 (que inter.) 87 post eius scr. et del. non C1ErL3/fuerit om.
EErL3P3RS; mg. a. m. C1/respiciens: respiciet EP3; respexerit R/ordinata . . . corpora
(88) inter. L3/post ordinata scr. et del. tunc P1

considerabit quantitatem eorum, et comprehendet remotionem
 90 illius superficiei, aut lineae, aut spatii et quantitatem obliquati-
 onis eius aut directionem eius ex comprehensione quantitatum
 remotionum extremitatum eius.

[3.113] Et si forma rei vise non fuerit manifesta, aut fuerit
 manifesta sed obliquatio non fuerit maxima, et remotio non
 95 fuerit respiciens corpora ordinata, non comprehendet visus
 certitudinem situs huiusmodi superficiei, aut lineae, aut spatii.
 Et cum hoc, quando visus comprehenderit formam non mani-
 festam, et non invenerit remotiones eius esse respicientes cor-
 pora ordinata, statim percipiet quod situs illius superficiei, aut
 100 lineae, aut spatii non certificatur.

[3.114] Secundum ergo istos modos comprehendit visus
 situs superficierum visibilium et situs linearum et spatiorum
 que sunt in superficiebus visibilium, scilicet que omnes sunt
 secantes lineas radiales.

[3.115] Quod vero est ex spatiis que sunt inter visibilia
 distincta in rebus remotioribus maximis—scilicet quando fuerit
 remotio utriusque visibilium que sunt apud duas extremitates
 spatii remotio maxima—comprehendetur ergo a visu tunc quasi
 directe oppositum, quamvis sit obliquum, quoniam non com-
 110 prehendit diversitatem que est inter remotiones extremitatum
 eius. Et si alterum duorum visibilium que sunt apud extremi-
 tates duas spatii fuerit propinquius altero, et senserit visus
 appropinquationem eius, comprehendit spatium quod est inter
 ea esse obliquum secundum quod comprehendit ex appropin-
 115 quatione propinquioris illorum duorum visibilium et ex remoti-
 one remotioris illorum. Et si alterum duorum visibilium fuerit
 propinquius, sed non visus comprehenderit appropinquatio-
 nem eius, non sentiet obliquationem spatii quod est inter ea.

89 eorum: earum *Er*; *corr. ex earum C1/post* comprehendet *scr. et del.* quantitatem *P1*
 90 aut¹ ... quantitatem *corr. ex* aut spatii et quantitatem aut lineae *Er* 92 extremitatum
 eius *transp. Er* 93 aut ... manifesta (94) *inter. L3; om. P3* 94 non¹ *om. R/maxima*
 ... fuerit (95) *om. S* 95 fuerit respiciens: respexerit *R* 96 superficiei *corr. ex*
 superficierum *P1* 97 cum hoc *om. R* 98 non: si *EL3P3; om. R/esse respicientes:*
 respicere *R* 99 *post situs scr. et del.* percipiet *S/aut lineae (100) inter. a. m. S*
 100 *post spatii add.* esse *P1S* 103 sunt secantes (104): secant *R* 106 in *corr. ex*
ex P1 107 utriusque: virtus que *S* 108 spatii ... maxima: maxima ... remotio
L3/remotio maxima transp. EP3R/comprehendetur: comprehenditur EP3R/ergo om.
EP3R/post visu scr. et del. ergo *E* 109 sit *om. C1; inter. a. m. Er* 110 remotiones:
 remotiores *P3* 111 extremitates duas (112) *transp. C1ErL3P3R* 112 *post spatii*
scr. et del. remotio maxima comprehendetur ergo a visu *C1/visus om. P1* 113 appropin-
 quationem *corr. ex* propinquationem *S/comprehendit: comprehendet R*
 114 appropinquatione (115) *alter. in approximatione EP3 (a. m. E)* 117 non: si *S/non*
visus transp. R/visus comprehenderit transp. C1Er/appropinquationem (118):
 appropinquatione *L3* 118 eius ... obliquationem *rep. P1*

120 Situs ergo superficierum, et linearum, et spatiorum secantium
lineas radiales non certificatur a visu nisi sit remotio eorum
mediocris, et cum hoc certificat visus equalitatem aut inequali-
tatem remotionum extremitatum eorum. Si autem visus non
certificaverit equalitatem remotionis extremitatum eorum, aut
inequalitatem, non poterit certificare situm illorum.

125 [3.116] Et plura illorum que comprehenduntur a visu ex
sitibus visibilium non comprehenduntur nisi per estimationem.
Si ergo fuerint in remotione mediocri, non erit magna diversitas
inter situm comprehensum a visu per estimationem et verum
situm, et si fuerint in remotione maxima, non distinguet inter
130 obliquum et directum. Quoniam visus, quando non compre-
henderit inequalitatem duarum remotionum duarum extremita-
tatum rei vise, comprehendet ipsas esse equales, et sic iudic-
abit ipsam rem visam esse directam.

[3.117] Secundum ergo istos modos erit comprehensio situ-
135 um superficierum, et linearum, et spatiorum per sensum visus.

[3.118] Situs vero partium rei vise adinvicem, et situs ter-
minorum superficiei rei vise aut superficierum eius adinvicem,
et situs visibilium distinctorum adinvicem (que collocantur sub
ordinatione) comprehenduntur a visu ex comprehensione loco-
140 rum visus ad que perveniunt forme partium et ex comprehen-
sione ordinationis partium forme que perveniunt ad visum a
virtute distinctiva. Quoniam forma cuiuslibet partium super-
ficiei rei vise pervenit in aliquam partem partis superficiei
membri sentientis in quam pervenit forma totius. Et cum su-
145 perficies rei vise fuerit diversorum colorum, et fuerint inter
partes eius differentie per quas distinguuntur partes adinvi-
cem, erit forma perveniens in visum diversorum colorum, et
erunt partes eius distincte secundum distinctionem partium

121 cum hoc: simul R/post hoc add. non R/visus corr. ex visum P3 122 si corr. ex
situs Er/si . . . eorum (123) mg. L3 123 remotionis corr. ex remotionum S
124 illorum: eorum C1Er 125 que inter. a. m. E/ante a scr. et del. a visu S
127 post ergo add. ipsa R/in remotione: intentione L3 129 fuerint: fuerit EL3P1P3S/
distinguet: distinguit L3 131 duarum² inter. L3 133 rem corr. ex esse a. m. E/
visam om. P1S 135 linearum: lineae P1 136 rei corr. ex reis P1/adinvicem: inter
se R 137 superficiei: superficierum EP3/ante rei scr. et del. et P3/aut . . . eius om. P1/
superficierum: superficiei R/adinvicem: inter se R 138 adinvicem: inter se R
139 ordinatione: ordine P1S 141 que perveniunt: pervenientis R/perveniunt:
pervenit C1ErL3; pervenerit EP3/ad visum om. EP3/a: ex L3; per R 142 virtute
distinctiva: virtutem distinctivam R/post virtute scr. et del. distiva P1/post quoniam
add. enim R/partium: partis C1Er/superficiei (143) om. P1 143 partis om. R
144 et: unde R/cum: in L3 146 distinguuntur: distinguitur Er; distinguantur R;
corr. ex distinguitur L3/partes² om. P3/adinvicem (147): inter se R 147 perveniens
corr. ex venientis P1/in: ad EL3P3R 148 distinctionem partium transp. R

superficie rei vise. Et sentiens sentit formam, et sentit quam-
 150 libet partium forme ex sensu colorum illarum partium et lucis
 que est in eis, et sentit loca formarum partium in visu ex sensu
 colorum partium illarum et lucis illarum, et virtus distinctiva
 comprehendit ordinationem illorum locorum ex comprehensio-
 ne diversitatis colorum partium forme et ex comprehensione
 155 differentiarum partium. Et sic comprehendit dextrum et sinis-
 trum, superius et inferius ex comparatione illorum adinvicem,
 et comprehendit contiguum et separatum.

[3.119] Situs vero partium rei vise adinvicem secundum
 accessionem et remotionem—scilicet secundum prominentiam
 160 et foundationem—comprehenduntur a visu ex comprehensione
 quantitatis remotionum partium ab eo et comprehensione
 diversitatis remotionum partium secundum magis et minus.
 Situs vero partium rei vise, quando fuerit in remotione medi-
 ocri, adinvicem secundum accessionem et remotionem com-
 165 prehendantur a visu, et hoc cum comprehenderit visus quan-
 titatem illius remotionis, et comprehenderit quantitates remoti-
 onum partium eius, et comprehenderit inequalitatem que est
 inter remotiones partium ab eo et equalitatem. Si autem visus
 non certificaverit quantitates remotionis eius et quantitatem
 170 remotionum partium eius, non comprehendet visus ordinati-
 onem partium eius secundum accessionem et remotionem apud
 visionem. Si autem fuerit ex visibilibus assuetis que cognos-
 cuntur a visu, comprehendet ordinationem partium eius secun-
 dum preminentiam et profundationem, et figuram superficie
 175 eius per cognitionem, non sola visione. Et si fuerit ex visibili-
 bus extraneis que visus non cognoscit, comprehendet superfici-

149 superficie: superficie L3 150 illarum partium *transp. C1Er/post partium² scr. et del. forme S* 152 partium illarum *transp. P3/illarum²: earum C1Er* 153 ordinationem: ordinem R/locorum: colorum C1Er 154 partium forme *om. P3* 156 ante superius *add. et C1Er/comparatione corr. ex comprehensione S/adinvicem: inter se R* 157 et¹ ... adinvicem (158) *inter. L3/post et¹ add. sic R/post comprehendit add. etiam R/separatum: separatim P1* 158 adinvicem: inter se R 159 scilicet *om. P3/prominentiam: praeeminentiam R* 160 et *inter. P3/foundationem: profundationem P3R; alter. in profundationem a. m. C1* 161 ab eo: a visu R 163 fuerit: fuerint EP3R; fuit L3 164 adinvicem: inter se R/comprehenduntur (165): comprehenditur C1Er 165 hoc *om. C1Er/hoc cum transp. EP3/cum om. Er; inter. a. m. C1/comprehenderit visus transp. R* 166 quantitates ... comprehenderit (167) *om. R* 167 partium *corr. ex partitium P3* 168 ab eo: a visu R; *inter. a. m. S/si: sic S* 169 non *om. P3; inter. E/remotionis: remotionum P1S/quantitatem: quantitates C1ErR* 170 ante visus *scr. et del. eius P1* 171 ante apud *add. eius P1* 172 ante si *scr. et del. eius S/post fuerit add. aliquid R* 173 comprehendet: comprehenditur P1 174 profundationem: profunditatem EP3R; foundationem L3 175 per: apud P3/ante non *scr. et del. partium P1* 176 extraneis *corr. ex extraneus S/cognoscit: cognoscet L3P1S*

em eius quasi planam quando non certificaverit quantitates
remotionum partium eius. Et ista intentio apparet quando
visus aspexerit aliquod corpus convexum aut concavum et
180 fuerit in remotione maxima, quoniam tunc visus non compre-
hendet concavitatem aut convexitatem, sed comprehendet
ipsum quasi planum.

[3.120] Et situs partium superficiei rei vise adinvicem in
diversitate ubitatum et in separatione et in continuatione non
185 comprehenduntur a visu nisi ex comprehensione partium forme
pervenientium in visu, et ex comprehensione diversitatum
colorum et differentiarum per que distinguuntur partes, et ex
comprehensione ordinationis partium forme a virtute distinc-
tiva. Et situs partium rei vise superficiei adinvicem in accessi-
190 one, et etiam secundum remotionem respectu visus, non com-
prehenduntur a visu nisi ex comprehensione quantitatis remo-
tionis partium et ex comprehensione inequalitatis et equalitatis
quantitatum remotionum eorum. Ordinatio ergo partium se-
cundum accessionem et remotionem illius cuius quantitates
195 remotionum partium certificantur a visu comprehenditur a
visu. Ordinatio autem partium illius remotionum partium
cuius quantitates non certificantur a visu non comprehen-
duntur a visu. Ordinatio autem partium rei vise distinctarum
comprehenditur a visu ex comprehensione locorum visus in que
200 perveniunt forme illarum partium et ex comprehensione dis-
tinctionis in visu a virtute distinctiva; et similiter de visibilibus
distinctis. Termini autem superficiei rei vise aut superficierum
eius et ordinatio eorum comprehenduntur a visu ex compre-
hensione partis superficiei eius in quam pervenit color illius
205 superficiei et lux eius a visu et ex comprehensione terminorum
illius partis et ordinationis circumferentie illius partis a virtute

178 eius *om.* P15 179 aspexerit: inspexerit EP3R 180 tunc visus *transp.* EL3P3R
181 concavitatem aut convexitatem: convexitatem aut concavitatem EP3R
183 adinvicem: inter se R 184 in² *om.* C1EErP3/non: et S 186 pervenientium:
provenientium L3; pervenientis R/visu: visum R/ex *om.* R/diversitatum: diversi-
tatis R 187 que: quas EP3R/distinguuntur: distinguitur Er/et² *om.* S; ex *om.* P3
188 a . . . distinctiva (189): per virtutem distinctivam R 189 rei vise superficiei:
superficiei rei vise C1EErP3R/adinvicem: inter se R/accessione (190) *corr.* ex actione L3
190 etiam *om.* L3 192 et¹ . . . partium² (196) *om.* P1/ex *om.* P3/inequalitatis et
equalitatis: equalitatis et inequalitatis R 193 eorum: earum EL3P3R/post partium
add. rei visae R 195 post partium *add.* eius S 196 autem: vero R 197 non²
inter. P1 198 post visu *scr.* et *del.* ordinatio (196) . . . visu (198) (certificantur:
certificatur) S 199 que: qua ErP3; *corr.* ex qua a. m. C1 200 perveniunt:
proveniunt EP3 201 in visu a *corr.* ex visu a. m. E/a . . . distinctiva: per virtutem
distinctivam R/similiter: si nichil Er/*corr.* ex si nichil a. m. C1/ante de *add.* est R
202 vise *corr.* ex visus C1 203 post et *scr.* et *del.* di P3 206 post ordinationis *add.*
illius P3/a . . . distinctiva (207): per virtutem distinctivam R

distinctiva. Secundum ergo istos modos comprehendit visus
situs partium visibilium, et situs partium superficierum visi-
bilium adinvicem, et situs terminorum superficierum, et situs
210 partium distinctarum visibilium adinvicem, et situs visibilium
distinctorum adinvicem.

[3.121] Corporeitas vero, que est extensio corporis secun-
dum trinam dimensionem, comprehenditur a visu in quibus-
dam corporibus et in quibusdam non. Tamen homo distingu-
215 ens iam quietum est apud ipsum quod non comprehenditur
sensu visu nisi corpus, et sic, quando ipse comprehendit visi-
bile, sciet statim quod est corpus, quamvis non comprehendat
extensionem eius secundum trinam dimensionem. Et visus
comprehendit in omnibus corporibus extensionem eorum se-
220 cundum longitudinem et latitudinem ex comprehensione super-
ficierum corporum oppositorum illi. Cum ergo comprehenderit
superficiem corporis, sciendo quod illud visibile est corpus,
comprehendet statim extensionem illius corporis secundum
longitudinem et latitudinem. Et non remanet nisi dimensio
225 tertia. Et quedam corpora continentur a superficiebus planis
secantibus se oblique adinvicem, et quedam continentur a
superficiebus concavis aut convexis, et quedam continentur a
superficiebus diversarum figurarum secantibus se oblique
adinvicem, et quedam continentur ab una superficie rotunda.
230 Corpus ergo quod continetur a superficiebus secantibus se
cuius una superficies est plana, quando comprehenditur a
visu, et fuerit superficies eius plana opposita visui et directa
ei, et fuerint superficies residue secantes superficiem directe
oppositam perpendiculares super superficiem directe opposi-
235 tam aut oblique super ipsam ad partem strictam ex parte pos-
teriori superficiei directe opposite, non apparebit visui ex eo

208 et . . . visibilium (209) *om.* P1S 209 adinvicem: inter se R/superficierum:
visibilium P1S/post superficierum *scr. et del.* distinctorum adinvicem corporeitas vero
que est extensio corporis S 210 post distinctarum *add.* vel superficierum P1S/
visibilium *inter. a. m.* E/adinvicem: inter se R 211 adinvicem: inter se R
212 corporis *om.* EL3P3R 213 dimensionem: diversionem S/post dimensionem
add. et L3 214 et in quibusdam *inter.* L3/homo distinguens (215): apud hominem
distinguentem R/distinguens iam (215) *transp.* C1 215 apud ipsum: principium R
216 comprehendit: videt C1Er; comprehendet R 217 sciet *corr.* ex fiet S 218 eius
om. EP3/dimensionem: diversionem S/et: etiam L3/post visus *scr. et del.* non L3
219 comprehendit: comprehendet C1ErL3/omnibus *om.* R 221 ante corporum *scr.*
et del. et P1 222 visibile *corr.* ex visibilium Er 224 latitudinem *corr.* ex
altitudinem P1 226 adinvicem *om.* R/et . . . convexis (227) *rep.* P1 229 adin-
vicem *om.* R/ab: sub C1/una superficie *transp.* P1 230 ergo: autem EL3P3R
232 post fuerit *scr. et del.* in S 233 ei et fuerint: et R/secantes: secuerint R
234 post oppositam¹ *add.* aut EP3R/perpendiculares . . . oppositam (235) *om.* Er/super
superficiem: superficie S 235 oblique *corr.* ex aliquae *a. m.* Er/strictam: districtam L3

nisi superficies directe opposita tantum. Ergo ex huiusmodi corporibus non comprehendit visus nisi longitudinem et latitudinem tantum; ergo non sentit corporeitatem corporum huiusmodi. Corpus autem quod continetur a superficiebus secantibus se, quando superficies eius fuerit opposita visui, sed non secundum directam oppositionem, et fuerit sectio istius superficiei cum alia superficie illius corporis comprehensa a visu ita quod poterit comprehendere duas superficies in simul, comprehendetur a visu tunc eius corporeitas. Quoniam comprehendet obliquationem superficiei corporis ad eius profunditatem, quare comprehendet extensionem corporis secundum profunditatem. Et comprehendet ex superficie obliqua extensionem in longum et latum, et sic comprehendet corporeitatem huiusmodi corporum.

[3.122] Et similiter, quando una superficierum corporis fuerit directe opposita visui, et fuerint superficies secantes illam superficiem aut una illarum obliqua super superficiem directe oppositam ad amplum ex parte posteriori superficiei directe opposite, quoniam visus comprehendet in tali corpore superficiem directe oppositam et superficiem oblique secantem superficiem directe oppositam. Et comprehendet etiam sectionem istarum superficierum, et sic, sicut diximus, comprehendet corporeitatem illius corporis. Et generaliter dico quod quodlibet corpus in quo visus potest comprehendere duas superficies secantes se comprehendet corporeitatem in illo.

[3.123] Corpora autem in quibus est superficies convexa comprehensa a visu, et fuerit illud quod continet ipsum una superficies aut multe superficies, visus poterit comprehendere corporeitatem eius ex comprehensione veritatis eius, quoniam quando superficies convexa fuerit opposita visui, erunt remo-

237 *post opposita add. visui P1* 239 *corporum om. R* 241 *quando: quanto S/ fuerit: fuit C1L3* 242 *sectio: secatio P3; corr. ex secatio E* 244 *quod poterit: ut possit R/in om. R* 245 *eius om. P1S/quoniam: quando C1ErP1* 246 *ante obliquationem scr. et del. eius C1* 248 *post profunditatem inter. cum a. m. Er/et: cum EL3P3R; om. L3; alter. in cum C1S (a. m. C1)/comprehendet: comprehenderit C1EErP3R*
251 *post similiter add. erit R/superficierum: superficies EP3* 252 *fuerit directe transp. R* 253 *illarum corr. ex linearum P1* 254 *amplum: partem amplam R*
255 *quoniam: quando S/corpore superficiem (256) transp. EP3* 256 *directe om. P3/ post superficiem² scr. et del. a Er* 258 *istarum superficierum transp. C1Er/ superficierum om. EP3* 259 *corporeitatem corr. ex corporeitates S/quodlibet (260): omne EP3R* 260 *corpus om. Er; inter. C1L3 (a. m. C1)/visus potest transp. EP3R*
261 *comprehendet... illo: comprehendetur in sua corporeitate a visu R/illo: illa C1Er; corr. ex illa L3* 262 *corpora: corporum R/quibus: qua Er; corr. ex qua a. m. C1*
263 *fuerit om. R/ipsum: ipsa P1S/post ipsum add. vel ipsa EP3; add. est aut R*
264 *post superficies² add. corporeitatem R/poterit comprehendere transp. R*
265 *corporeitatem eius om. R* 266 *quando: si R*

tiones partium eius a visu inaequales, et erit medium eius propinquius extremitatibus visui. Et cum visus comprehenderit convexitatem eius, comprehendet quod medium eius est sibi
 270 propinquius extremitatibus. Et cum senserit quod medium eius est propinquius illi et quod extremitates sunt remotiores, sentiet statim quod superficies est exiens apud ipsum ab ultimis tendentibus ad posterius, et sic sentiet extensionem corporis in profunditate respectu superficiei directe opposite. Et
 275 ipse comprehendet extensionem illius corporis secundum longitudinem et latitudinem ex comprehensione extensionis superficiei convexae secundum longitudinem et latitudinem. Et similiter, si alia superficies corporis preter superficiem directe oppositam fuerit convexa, et comprehenderit visus convexitatem eius, quoniam visus etiam comprehendet extensionem eius
 280 secundum trinam dimensionem.

[3.124] Corpus autem in quo est superficies concava comprehensa a visu, quando visus senserit aliam superficiem illius corporis et senserit sectionem eius cum superficie concava,
 285 tunc sentiet obliquationem illius corporis superficiei, et cum senserit obliquationem illius superficiei, statim sentiet corporeitatem eius. Si autem superficies eius concava fuerit comprehensa a visu, et non apparuerit visui alia superficierum residu-
 arum, non comprehendet visus corporeitatem huiusmodi corporis, nec visus comprehendet ex huiusmodi corporibus nisi
 290 extensiones eius secundum duas dimensiones corporis tantum. Visus autem non sentiet corporeitatem huiusmodi corporum nisi per scientiam precedentem tantum, non per sensum trium dimensionum illius corporis. Et superficies concava extenditur

268 visui: visus *R/comprehenderit*: comprehendit *P1S* 270 *post* propinquius *scr.*
et del. et quod extremitates eius *P3/extremitatibus* . . . propinquius (271) *mg.* *L3/*
extremitatibus . . . illi (271) *mg.* *a. m.* *E* 271 *et om.* *L3/post* extremitates *add.*
 eius *EP3R* 272 *est* . . . apud: exit ad *R* 275 illius corporis *transp.* *P1R*
 276 et latitudinem *om.* *L3P1/ex* . . . latitudinem (277) *mg.* *L3* 280 quoniam: quando
P1/quoniam visus *om.* *R/etiam* comprehendet *transp.* *R* 282 corpus autem: si vero
 corpus *R/superficies* concava *transp.* *L3* 283 a visu *inter. a. m.* *E/quando om.* *R/*
 visus . . . superficiem: aliam superficiem . . . visus *R/illius* corporis (284) *om.* *R*
 284 *post* senserit *scr.* *et del.* *sen P3* 285 illius . . . superficiei: superficiei . . . illius
EP3R/corporis . . . obliquationem (286) *om.* *Er/et* . . . superficiei (286) *mg.* *L3*
 286 *post* illius *scr.* *et del.* superficiei corporis *P1* 287 eius²: illius *EL3P3; om.* *R/*
 concava fuerit *transp.* *EP3R* 288 superficierum *corr.* *ex* superficiem *P3*
 289 corporeitatem *corr.* *ex* extremitatem *P3/huiusmodi* illius *CIEErL3P3R* 290 nec
corr. *ex in S/corporibus alter. in corpore a. m.* *C1* 291 extensiones: extensionem *L3/*
corporis om. *R/corporis* tantum *transp.* *EP3* 292 visus autem: et *R/corporum*
om. *P1S* 293 tantum *inter. a. m.* *E* 294 dimensionum *corr.* *ex* dimensionem *S/*
post concava *scr.* *et del.* *est P3/extenditur etiam* (295) *transp.* *EP3R*

295 etiam in profunditate propter propinquitatem extremitatum
eius visui et remotionem medii, sed non comprehenditur ex
extensione profunditatis nisi extensio vacuitatis, non extensio
corporis visi cuius superficies est illa superficies concava.

[3.125] Comprehensio ergo corporeitatis a visu non est
300 nisi ex comprehensione obliquationum superficierum corporum.
Et obliquationes superficierum corporum per quas significatur
visui quod corpora sint corpora non comprehenduntur a visu
nisi in corporibus quorum remotio est mediocris. In corporibus
autem maxime remotionis quorum remotio non certificatur a
5 visu non comprehendit visus obliquationes superficierum. Et
sic non comprehendit corporeitatem eius per sensum visus,
quoniam in talibus corporibus non comprehendit visus situs
partium superficierum eorum adinvicem, nec comprehendit
ipsas nisi planas. Et sic non comprehendit obliquationes su-
10 perficierum, et sic non comprehendit corporeitatem. Visus
ergo non comprehendit corporeitatem corporis maxime remoti-
onis cuius remotio non certificatur illi.

[3.126] Et ipse comprehendit corporeitatem corporum ex
comprehensione obliquationum superficierum corporum, et
15 obliquationes superficierum corporum non comprehenduntur a
visu nisi in visibilibus mediocris remotionis quorum situs parti-
um superficierum adinvicem comprehenduntur a visu. Et pre-
ter ista visibilia non comprehendit corporeitatem eius visus, et
non comprehendit corporeitatem eius nisi per scientiam ante-
cedentem tantum.
20

[3.127] Figura autem rei vise dividitur in duo quorum alter-
um est figura circumferentie superficiei rei vise aut circumfer-
entie alicuius partis rei vise. Secundum autem est figura cor-
poreitatis rei vise aut figura corporeitatis alicuius partis rei
25 vise—et iste modus est forma superficiei rei vise cuius corpor-

295 profunditate: profunditatem *P1S/post propter scr. et del. ex P3* 296 visui: ad
visum *R/sed: et L3/post non scr. et del. extenditur P1/ex inter. L3* 297 post extensione
scr. et del. propter P1 298 visi: nisi *C1ErL3P1P3S; corr. ex nisi a. m. E/superficies est*
mg. a. m. E/superficies concava corr. ex concava superficies P3 300 obliquationum:
obliquationis *EL3P3R/post obliquationum add. corporum vel P1S* 1 obliquationes:
obliquitates *EP3R* 2 sint: sunt *L3/corpora om. P3* 4 quorum . . . remotionis (11/
12) *mg. L3* 8 adinvicem: inter se *R* 10 post sic *add. denique R* 14 et . . . non
(15) *mg. L3* 17 adinvicem: inter se *R* 18 ista visibilia: istorum visibilium
corporeitatem *R/comprehendit corr. ex comprehendet Er/eius om. R/visus om. C1Er/*
post visus add. tantum S/et . . . eius (19) om. R 19 comprehendit corporeitatem
transp. L3/antecedentem (20): antecedentium L3 20 tantum *om. S* 21 autem:
vero *C1Er* 22 circumferentie¹ *inter. a. m. L3/superficie inter. EL3/post aut add. ex P3*
23 ante alicuius *add. superficiei rei vise P1 (superficiei inter.)/vise om. P1* 24 ante
alicuius *add. rei vise S/alicius . . . vise¹ (25) corr. ex partis rei vise alicuius C1*

eitas comprehenditur per sensum visus aut forma partis superficiei rei vise cuius corporeitas comprehenditur. Et omne quod visus comprehendit ex figuris visibilibus dividitur in istos modos.

30 [3.128] Figura vero circumferentie superficiei rei vise comprehenditur a sentiente ex comprehensione circumferentie forme que pervenit in concavum nervi communis et ex comprehensione circumferentie partis superficiei membri sentientis in quam pervenit forma rei vise, quoniam in utroque istorum
35 locorum figuratur circumferentia superficiei rei vise. Quem ergo istorum locorum averterit sentiens poterit comprehendere in eo figuram circumferentie rei vise. Et similiter figura circumferentie cuiuslibet partium superficiei rei vise comprehenditur a sentiente ex sensu ordinationis partium terminorum partis forme.
40 Et cum sentiens voluerit certificare figuram circumferentie superficiei rei vise aut figuram circumferentie alicuius partis rei vise, movebit axem radialem super circumferentiam rei vise. Et sic per motum certificabit situm partium terminorum forme superficiei aut partis superficiei que est in superficie membri
45 sentientis et que est in concavo nervi communis, quare comprehendet ex certificatione situum terminorum forme figuram circumferentie superficiei. Secundum ergo hunc modum erit comprehensio figure circumferentie rei vise et figure circumferentie cuiuslibet partis superficiei rei vise per sensum visus.

50 [3.129] Forma autem superficiei rei vise non comprehenditur a visu nisi ex comprehensione situum partium superficiei rei vise et ex dissimilitudine situum partium superficiei rei vise et consimilitudine eorumdem. Et certificatur forma superficiei ex comprehensione diversitatis inequalitatis remotionum partium
55 superficiei rei vise et equalitatis earum, aut inequalitatis elevationum partium superficiei et equalitatis earum. Quoni-

28 visibilibus: visibilium P3; corr. ex visibilium a. m. E 30 post vero scr. et del. s P3/
post vise scr. et del. comprehendit et E 34 istorum om. P3 35 quem: quoniam
C1ErP1; quemcunque R; quando S 36 post ergo mg. in utroque a. m. C1/averterit:
animadverterit R 38 comprehenditur a sentiente (39): a . . . comprehenditur L3
39 sensu: visu P1 41 superficiei . . . circumferentie inter. L3/alicius om. EP3R
43 per . . . certificabit: certificabit per motum C1Er/certificabit: certificabis S 44 aut
. . . superficiei om. R 45 que om. EL3P3R/est om. R/quare: quia P1 47 post
superficiei add. rei EP3R (inter. E/post rei add. visae R) 48 circumferentie rei vise: rei
vise circumferentie L3/circumferentie² corr. ex circumferentia C1 49 ante cuiuslibet
scr. et del. rei vise S/superficiei om. P3 52 et om. P1/et . . . vise inter. L3/dissimilitudine:
consimilitudine EP3R/post dissimilitudine add. et similitudine eorumdem EP3 (et
similitudine inter. a. m. E)/situum . . . vise om. R/partium . . . eorumdem (53) om. EP3
53 consimilitudine: dissimilitudine R/eorumdem: earum P1S/post eorumdem add.
situum R 54 remotionum corr. ex remotionis a. m. E 56 ante et scr. et del. rei
vise S

am convexitas superficiei non comprehenditur a visu nisi ex
comprehensione propinquitatis partium mediarum in super-
ficie et remotionis partium in terminis, aut ex inequalitate ele-
vationum partium eius quando superficies superior corporis
60 fuerit convexa. Et similiter convexitas termini superficiei non
comprehenditur a visu nisi ex comprehensione propinquitatis
medii et remotionis extremitatum quando convexitas eius op-
ponitur visui, aut ex inequalitate elevationum partium eius
65 quando gibbositas eius fuerit inferius aut superius, aut ex
inequalitate dextri partium eius aut sinistri eius quando gib-
bositas eius fuerit dextra aut sinistra.

[3.130] Concavitas autem superficiei, quando opponitur
visui, comprehenditur a visu ex comprehensione remotionis
70 partium mediarum et appropinquatione extremitatum ter-
minorum. Et similiter est de concavitate terminorum super-
ficiei quando opponitur visui. Et visus non comprehendit
concavitatem superficiei quando concavitas fuerit opposita
superius, aut inferius, aut apud latus nisi quando superficies
75 concava fuerit in parte abscisa et apparuerit arcualitas termini
eius que est versus visum.

[3.131] Planities autem superficiei comprehenditur a visu
ex comprehensione equalitatis remotionis partium et consimili-
tudinis ordinationis eorum, et similiter rectitudo termini super-
80 ficiei quando terminus opponetur visui. Rectitudo termini
autem superficiei, et arcuitas et curvitas eius quando superfi-
cies fuerit opposita visui, et fuerint termini continentes ipsam,
comprehenduntur a visu ex ordinatione partium eius adin-
vicem.

85 [3.132] Convexitas autem superficiei rei vise que oppone-

57 *post nisi add.* aut R 58 *propinquitatis corr. ex diversitatis L3* 59 *partium om.*
P1/ex om. P3 62 *post visu scr. et del. n Er/post nisi add.* aut R 63 *quando:*
quoniam Er/eius *inter. a. m. E* 65 *quando: quoniam P3; corr. ex quoniam a. m. E/*
inferius: deorsum R/inferius . . . fuerit (67) mg. a. m. E/superius: sursum R 66 *dex-*
tri om. R; inter. L3/post eius¹ add. quod in eo dextrum est R/*post* aut *add. in Er/sinistri:*
sinistrum R/eius² om. R 69 *post visui inter. et a. m. E* 70 *ante et scr. et del. a P3*
71 *et om. R/superficiei (72): superficierum P1* 73 *opposita: posita P1S* 74 *su-*
perius: sursum R/inferius: deorsum R/apud: ad R/apud latus: in planis EL3P3
75 *termini corr. ex terminorum P1* 77 *superficiei: superficierum EP3R*
78 *equalitatis corr. ex qualitatis L3/remotionis: remotionum EP3R* 79 *eorum:*
earum EP3R/post similiter add. comprehenditur R 80 *termini autem (81)*
transp. C1ErR 81 *autem: aut P1S; enim R/et arcuitas om. P3/arcuitas: arcualitas R;*
alter. in arcualitas a. m. C1/et²: aut EL3P3R 82 *fuerint om. R/continentes: continuerint*
R/ipsam: ipasam S 83 *comprehenduntur: comprehenduntur EP3; comprehenditur*
R/adinvicem (84): inter se R 85 *autem: ergo C1EErL3P3R/opponetur (86): opponi-*
tur EP3R

tur visui, et concavitas eius, et planities eius comprehenduntur a visu ex comprehensione diversitatis remotionum partium superficiei, aut elevationum earum, aut latitudinum earum, et equalitatis earum, et ex quantitibus excessus remotionis partium, aut elevationum, aut latitudinum earum adinvicem. Et similiter convexitas et concavitas eius, et planities cuiuslibet partis rei vise comprehenditur a visu ex comprehensione excessus remotionum partium illius partis, aut excessus elevationum aut latitudinum eorum, aut equalitatis earum. Et propter istam causam non comprehendet visus concavitatem et convexitatem nisi in visibilibus quorum remotio est mediocris. Visus autem comprehendit propinquitatem quarumdam partium superficiei et remotionem quarumdam per corpora intervenientia ipsi et superficiei et per corpora respicientia remotiones partium quorum appropinquatio et remotio certificantur a visu. Et cum quedam partes superficiei fuerint prominentes et quedam profunde, comprehendit visus prominentiam et profunditatem illarum per obliques superficierum partium, et sectiones partium, et curvitates earum in locis profunditatis, et per situs superficierum partium adinvicem. Et hoc erit quando visus non comprehenderit illam superficiem ante, nec aliquam huiusmodi generis. Si autem illa res visa fuerit ex visibilibus assuetis, comprehendet visus formam eius et formam superficiei per cognitionem antecedentem. Forma autem rei vise que continetur ex superficieribus secantibus se et diversorum situum comprehenditur a visu ex comprehensione sectionis superficierum eius, et ex comprehensione situs cuiuslibet superficierum eius, et ex comprehensione forme cuiuslibet superficierum eius.

86 ante visui scr. et del. a E/eius¹ om. P1/eius² om. EP3R 87 remotionum: remotionis EL3P3R 88 superficiei: superficierum Er/elevationum corr. ex elevationem S/latitudinum alter. ex latitudinem in latitudine S/latitudinum . . . equalitatis (89) om. Er/et . . . earum (89) om. EP3R; inter. L3 89 equalitatis: equalitate L3P1S/earum om. S/et . . . earum (90) mg. a. m. E 90 earum: eorum P1S/adinvicem: inter se R 91 eius om. R 94 eorum: earum C1ErP3R/aut: et C1Er/equalitatis: equalitas Er 95 comprehendet: comprehendit R 97 comprehendit: comprehendet C1/quarumdam om. P1; corr. ex quorumdam L3/partium (98) . . . quarumdam (98) om. R 98 superficiei: superficierum P1/quarumdam: quorumdam P1S; corr. ex quorumdam L3/post per add. quedam EP3/post corpora add. quedam P1/intervenientia (99): venientia Er; corr. ex venientia a. m. C1 99 ante ipsi add. inter ipsum R/ipsi et om. Er; inter. a. m. C1/superficie: superficiem R 100 quorum: quarum P3R/certificantur: certificatur R 102 post profunde add. et L3/comprehendit: comprehendet R 103 obliques: obliques EL3P3R/partium inter. a. m. S/et . . . partium (104) mg. L3 105 adinvicem: inter se R 106 illam superficiem transp. L3 107 huiusmodi: huius C1R 108 formam²: formarum S 109 forma mg. P3 110 secantibus inter. L3/se om. P3 111 superficierum (112): superficiei C1EErL3P3R 112 et . . . eius¹ (113) om. P1/ex om. S 113 et . . . eius² om. P1; mg. a. m. E/forme cuiuslibet transp. C1Er; om. R/superficierum: superficiei EP3/eius²: earum inter se R

[3.133] Forme ergo figurarum rerum visarum quarum cor-
 115 poreitas comprehenditur a visu comprehenduntur ex compre-
 hensione formarum superficierum earum et ex comprehensione
 situum superficierum earum adinvicem. Et forme superficie-
 rum visibilium quarum partes sunt diversi situs comprehen-
 120 duntur a visu ex comprehensione convexitatis, et concavitatis,
 et planitiei partium superficierum eorum visibilium, et premi-
 nentie et profunditatis partium superficie. Secundum ergo
 hunc modum erit comprehensio formarum superficierum visi-
 bilium et figurarum earum. Et cum sentiens voluerit certificare
 formam superficie rei vise aut formam alicuius partis rei vise,
 125 movebit visum in oppositione eius, et faciet transire axem
 radialem super omnes partes eius donec sentiet remotiones
 partium eius, et situs cuiuslibet illarum apud visum, et situm
 illarum adinvicem. Et cum sentiens comprehenderit remotio-
 nes partium superficie et situs earum, et comprehenderit pre-
 130 minentiam et profunditatem illarum, comprehendet formam
 illius superficie rei vise, et certificabit figuram eius. Et multo-
 tiens errat visus in eo quod comprehendit ex formis superficie-
 rum visibilium et formis figurarum visibilium, et non percipit
 errorem. Quoniam convexitas parva, et concavitas parva, et
 135 prominentia, et profunditas parva non bene comprehenduntur
 secundum accessum ad visum, quamvis eorum remotio sit
 mediocris, nisi sit propinqua valde visui.

[3.134] Visibilia ergo quorum forme comprehenduntur a
 visu sunt illa quorum quantitates partium superficierum com-
 140 prehendantur a visu et quorum excessus et equalitas remotio-
 num partium comprehenduntur a visu, et visibilia quorum

114 ergo: igitur P1R 115 comprehenditur: comprehenduntur S/post visu scr. et del.
 a S/comprehensione (116) ... ex (116) rep. P1 117 adinvicem: inter se R 119 post
 comprehensione add. formarum superficierum earum et ex comprehensione
 superficierum earum adinvicem et forme superficierum visibilium quarum partes sunt
 diversi situs comprehenduntur a visu ex comprehensione EL3P3 (mg. a. m. E/post
 comprehensione¹ add. situum L3/comprehensione² om. L3) 120 ante et¹ add.
 comprehensione L3/eorum visibilium: in visibilibus R/preminentie (121): promi-
 nentie EP3R 121 profunditatis corr. ex profunditas L3/post profunditatis add.
 visibilium EP3/ergo hunc (122) corr. ex hunc ergo P3 122 formarum superficierum
 transp. EP3R 123 post cum scr. et del. senserit P1/post certificare scr. et del. forma P3
 124 formam¹ corr. ex formarum S 125 visum corr. ex ipsum L3/oppositione:
 oppositionem R/faciet: faciat Er 126 sentiet: sentiat R/remotiones om. EP3
 128 illarum: earum EL3P3R/adinvicem: inter se R/remotiones (129): remotionem EP3
 129 superficie: superficierum EL3P3R/et² inter. L3/preminentiam (130): prominen-
 tiam R 130 illarum om. R 131 certificabit: certificabis S 132 formis corr.
 ex forma P1 134 parva² om. L3 135 prominentia: preminencia P1/bene
 om. EP3R 139 comprehenduntur (140): comprehenditur P1 140 et¹ inter. L3/
 excessus: recessus EP3/equalitas: qualitas ErS; equalitates P1R

forme certificantur a visu sunt illa quorum quantitates remoti-
onum partium et quorum quantitates excessus remotionis par-
tium certificantur a visu. Et similiter figure circumferentiarum
145 superficierum visibilium et figure circumferentiarum partium
superficierum visibilium non certificantur a visu nisi sint in
remotionibus mediocribus, et certificaverit visus ordinationem
terminorum earum et situum partium terminorum earum adin-
vicem, et certificaverit angulos earum. Et quorum situs termi-
150 norum non certificantur a visu nec anguli eorum, si habuerint
angulos, non certificabit visus figuras eorum. Omnes ergo
figure visibilium comprehenduntur a visu secundum modos
quos declaravimus.

[3.135] Magnitudo vero et quantitas rei vise comprehen-
155 duntur a visu, sed qualitas comprehensionis eius est ex intenti-
onibus dubitabilibus in qualitate comprehensionis magnitudi-
nis. Et plures illorum opinantur quod quantitas magnitudinis
rei vise non comprehenditur a visu nisi ex quantitate anguli qui
fit apud centrum visus quem continet superficies piramidis
160 radialis cuius basis continet rem visam, et quod visus compar-
at quantitates rerum visarum ad quantitates angulorum qui
fiunt a radiis qui continent res visas apud centrum visus. Et
non sustentatur in comprehensione magnitudinis nisi super
angulos tantum. Et quidam illorum opinantur quod compre-
165 hensio magnitudinis non completur in comparatione ad angu-
los tantum, sed per considerationem remotionis rei vise et situs
eius cum comparatione ad angulos.

[3.136] Et veritas est quod non est possibile ut sit compre-
hensio quantitatum rerum visarum a visu ex comparatione ad
170 angulos quos res vise respiciunt apud centrum visus tantum,
quoniam eadem res visa non diversatur in quantitate apud
visum, quamvis remotiones eius diversentur diversitate non

145 et . . . visibilium (146) *om. C1Er* 146 visibilium *corr. ex visibilia S/sint: sit L3*
147 remotionibus: remotioribus *C1Er* 148 et . . . earum *om. P1/situum: situm R/*
adinvicem (149): inter se R 149 *post certificaverit scr. et del. visus ordinationem S/*
quorum: in quibus R 150 eorum *om. R* 151 *post angulos add. in ijs R/eorum:*
earum EL3P3; om. R/ergo: igitur P1 152 comprehenduntur *corr. ex*
comprehenduntur S 154 *post et add. etiam C1EErP3/comprehenduntur (155):*
comprehenditur C1Er 155 qualitas: equalitas *P3* 156 dubitabilibus: dubitatibus
Er/in . . . magnitudinis¹ (157) om. R 157 illorum *om. R* 158 anguli *corr. ex angeli*
S/qui: que C1Er 159 fit: sit *C1L3P1S/continet: continent EP3/superficies:*
superficiem E 162 qui . . . centrum *om. P1* 163 sustentatur: substentatur *EP3*
164 quidam: quidem *P3* 168 est¹: eius *L3/sit om. E; mg. P3* 170 quos . . .
quantitate (171) mg. L3 171 *post visa scr. et del. fuerit S* 172 *post eius scr. et del.*
o L3/diversentur: diversantur L3P3

magna. Quoniam quando res visa fuerit prope visum, et com-
prehenderit visus quantitatem eius, et postea fuerit elongata a
175 visu, non multum diminuetur eius quantitas apud visum quan-
do remotio secunda fuerit mediocris. Et nunquam diversatur
quantitas alicuius rei vise assuete apud visum quando remoti-
ones eius diversantur et cum fuerint ex remotionibus medio-
cribus.

180 [3.137] Et similiter corpora equalia diversarum remotio-
num, quando remotio remotissimi illorum fuerit mediocris,
comprehenduntur a visu equalia. Sed anguli quos respicit una
eadem res visa in remotionibus diversis mediocribus diversan-
tur diversitate alicuius quantitatis. Quoniam, quando res visa
185 fuerit remota a visu per unum cubitum, deinde si elongetur a
visu donec fuerit eius remotio per duos cubitos, erit inter duos
angulos qui fiunt apud visum ab illa re visa magnus excessus.
Et tamen non comprehendit visus rem visam in remotione duo-
rum cubitorum minorem quam in remotione unius cubiti. Et
190 similiter, si elongetur a visu per tres cubitos aut quattuor, non
videbitur minor, quamvis anguli qui fiunt apud visum diver-
sentur diversitate extranea.

[3.138] Et etiam iterum, si in superficie alicuius corporis
signetur figura quadrata equalium laterum et rectorum angu-
195 lorum, et elevetur illud corpus donec eius superficies in qua est
quadratio sit prope equidistantiam visus et ita quod visus cum
hoc comprehendat figuram quadratam, comprehendet visus
figuram quadratam equalium laterum, et cum hoc anguli quos
respiciunt latera quadrata apud centrum visus erunt inequales
200 quando centrum visus fuerit prope superficiem in qua est quad-
ratio. Et tamen visus comprehendet latera quadrati equalia.

[3.139] Et similiter, quando in circulo extrahuntur dyametri

173 visa om. R/comprehenderit visus (174) *transp.* R 174 visus: ipse R 175 post
multum *add.* non C1EL3P3R (*inter.* L3) 176 ante remotio *add.* eius EP1P3R/secunda
om. EP1P3R 177 apud: ipsum P1; propter S 178 cum: tamen C1EErL3P3; om.
R/remotionibus: remotioribus S 181 post remotio *scr. et del.* remotionum C1Er; *scr.*
et del. remotionis L3/remotissimi om. C1EErL3P3R/post remotissimi *scr. et del.* c P1
182 comprehenduntur: comprehenduntur EP3R/post una *add.* et C1R (*inter.* a. m. C1)
184 quando . . . visa: res visa quando C1Er 186 eius remotio *transp.* C1/cubitos
. . . *inter.* mg. L3/duos² om. L3 187 qui fiunt om. P3/fiunt: fuerint C1Er/visa om. L3
188 tamen *corr.* ex cum S 190 post si *scr. et del.* eg P3 191 fiunt: fuerint C1Er
193 iterum: verum S; om. R/si om. S 194 post equalium *scr. et del.* q P3 195 eius
superficies *transp.* R 196 quod: ut R/cum hoc (197) om. R 198 quadratam:
quadrilateram EL3P3R/et . . . equalia (201) mg. a. m. E/cum hoc: tamen P1RS/hoc
inter. L3 199 quadrata: quadrati P1RS/quadrata . . . latera (201) mg. a. m. L3/erunt
inequales om. C1EErL3P3R 201 ante et *add.* erunt diversi C1EErP3R; *add.* erunt
inequales L3/et om. EP3/tamen: cum nihilominus R; *corr.* ex tantum S/comprehendet:
comprehendat R 202 quando: cum P1S

diversorum situum, deinde elevetur superficies in qua est circulus donec sit prope equidistantiam visus, erunt anguli quos
 205 respiciunt dyametri circuli apud centrum visus diversi magna diversitate secundum diversitatem situs dyametrorum. Et tamen visus non comprehendit dyametros circuli nisi equales quando remotio eorum fuerit mediocris.

[3.140] Si ergo comprehensio rerum visarum esset ex
 210 comparatione ad angulos tantum qui fuerint ex visibilibus apud centrum visus, non comprehenderentur latera quadrati equalia, nec comprehendentur dyametri circuli equales, nec circulus comprehenderetur rotundus, nec comprehenderetur una res visa in remotionibus diversis unius quantitatis. Ex experimentatione ergo istarum intentionum, patet quod comprehensio quantitatum rerum visarum non est ex comparatione ad angulos tantum.

[3.141] Et cum hoc declaratum est, modo certificemus qualitatem comprehensionis magnitudinis. Et iam declaratum
 220 est quod sustentatio in comprehensione plurium sensibilibus non est nisi super argumentationem et distinctionem. Magnitudo autem est una intentionum que comprehenduntur ratione et argumentatione, et radix super quam sustentatur virtus distinctiva in distinctione quantitatis magnitudinis rei vise est
 225 quantitas partis visus in qua pervenit forma rei vise. Et pars in qua pervenit forma rei vise determinatur et mensuratur per angulum qui est apud centrum visus quem continet piramis radialis continens rem visam et partem visus in qua pervenit forma rei vise. Pars ergo visus in qua pervenit forma rei vise et
 230 angulus quem continet piramis radialis continens illam partem sunt radix quam non possunt sensus et distinctio vitare in

203 elevetur: elevatur R/post est scr. et del. superficies c P3 204 sit: si Er
 205 magna diversitate (206) transp. EP3R 207 tamen: cum L3 208 eorum: circulo-
 rum R/post fuerit scr. et del. remotio P3 210 post qui add. prius EP3/fuerint:
 fuerunt E; fiunt R; fierint S 211 comprehenderentur: comprehenduntur EP1P3/
 latera quadrati transp. R/quadrati: quadrata P3 212 equalia corr. ex equaliam P1/
 comprehenduntur: comprehenduntur EP3; comprehenderentur R 213 com-
 prehendetur^{1,2}: comprehenderetur R/ante rotundus add. circulus R/comprehendetur²
 alter. ex comprehendantur in comprehendatur S 214 remotionibus: rebus R/post
 quantitatis add. et L3P1S/ex om. EL3P3R 215 ergo: igitur R 218 modo:
 quomodo R 221 super: per L3/distinctionem: extensionem EEP3; corr. ex
 extensionem C1L3S (a. m. C1S) 223 post radix scr. et del. qua S 224 post in add.
 comprehensione vel EP3 225 qua: quam EP3R 226 qua: quam R/vise om. P3;
 inter. a. m. E 227 quem: que P1 228 continens corr. ex continentem S/qua:
 quam R 229 pars . . . vise mg. a. m. C1EEr/post ergo scr. et del. rei P3/qua:
 quam C1ErR 230 continet: tinet P3/post radialis add. est S/post continens scr. et del.
 rem E 231 sunt: ut S/possunt: possint P1S; potest R

comprehensione magnitudinis rei vise.

[3.142] Sed tamen non sufficit virtuti distinctivae in comprehensione magnitudinis consideratio anguli tantum, aut
 235 consideratio partis visus respicientis angulum tantum, quoniam una res visa, quando comprehenditur a visu, et est prope ipsum, comprehendet sentiens locum visus in quem pervenit forma rei vise, et comprehendet quantitatem illius loci. Deinde, quando illa res visa elongabitur a visu, comprehendetur
 240 etiam a visu, et comprehendet sentiens locum visus in quem pervenit forma eius secundo, et comprehendet quantitatem loci. Et manifestum est quod locus visus in quem pervenit forma eius primo et locus visus in quem pervenit forma eius secundo diversantur secundum quantitatem, quoniam locus
 245 forme in visu erit secundum quantitates anguli quem respicit illa res visa apud centrum visus. Et quanto magis elongabitur res visa, tanto magis strictificabitur piramis continens ipsam, et eius angulus, et locus visus in quem pervenit forma. Et cum sentiens comprehenderit locum in quem pervenit forma rei vise,
 250 et comprehendit quantitatem loci, comprehendet diminutionem loci apud remotionem rei vise a visu.

[3.143] Et ista intentio multotiens et sepe revertitur ad visum, scilicet quod visibilia semper elongantur a visu, et visus
 255 ab eis, et appropinquant visui, et visus illis, et visus comprehendit ipsa, et comprehendit diminutionem locorum formarum illorum in visu apud remotionem, et comprehendit augmentationem locorum formarum illorum in visu apud appropinquationem. Ex frequentia ergo istius intentionis quievit in anima

232 magnitudinis: magnitudinum L3/rei . . . comprehensione (233/234) *mg.* L3
 233 virtuti *om.* EE^rL3P3; *mg.* a. m. C1 234 magnitudinis *om.* L3 235 respicientis:
 respiciens C1Er/angulum: anguli P1/quoniam (236): quia C1 236 quando *inter.*
 a. m. E 238 rei . . . forma (241) *mg.* a. m. E/loci *corr.* ex locis P3 239 visa *om.* P1S
 240 comprehendet: comprehendit P1/quem: quantum EP3 243 post eius¹ *scr.* et *del.*
 secundo C1ErL3/primo . . . quantitatem (244) *mg.* C1ErL3 (a. m. C1Er) 244 post
 quoniam *scr.* et *del.* est S 245 visu: visum Er 247 post tanto *scr.* et *del.* n C1/
 strictificabitur: angustabitur R/ipsam: ipsum EP3 248 post eius *scr.* et *del.* et L3/
 locus *inter.* L3/forma . . . pervenit (249) *om.* P1 249 post pervenit *scr.* et *del.* rem S
 250 comprehendit: comprehenderit EP3R/loci *corr.* ex locis S/comprehendet:
 comprehendit S 252 multotiens et *om.* R/revertitur *corr.* ex revertetur S
 253 quod: quando P3/semper: saepe R; *alter.* in sepe L3 254 illis: simul P1S/
 comprehendit (255) *corr.* ex comprehendet Er 255 ante ipsa *add.* ipsam et visus
 comprehendit C1EE^rL3P3 (*mg.* a. m. E) 256 illorum: illarum P1R/apud: propter
 P1/apud . . . visu (257) *mg.* a. m. E/augmentationem (257): argumentationem Er; *corr.*
 ex argumentationem C1L3 (a. m. C1) 257 ante locorum *scr.* et *del.* quantitatis rei vise
 P3/post formarum *scr.* et *del.* in S/illarum: illarum R 258 ante ex *add.* quare ad
 comprehensionem quantitatis rei vise adiungit virtus distinctiva remotionem rei vise
 ad angulum piramidis radialis qui est in centro oculi EL3P1P3R (*mg.* a. m. L3/qui *alter.*
 in que a. m. E)/ex *om.* S/ergo: igitur P1/post istius *scr.* et *del.* rei vise P3

apud virtutem distinctivam quod, quanto magis res visa elon-
 260 gatur a visu, tanto diminuitur locus forme eius in visu et angu-
 lus quem respicit res visa apud centrum. Et cum hoc est, est
 quietum in distinctione quod locus in quem pervenit forma rei
 vise, et angulus quem respicit res visa apud centrum visus, non
 erit nisi secundum remotionem rei vise a visu. Et cum hoc qui-
 265 etum est in anima, quando virtus distinctiva distinxerit quan-
 titatem rei vise, non considerabit angulum tantum, sed consid-
 erabit angulum et remotionem in simul, quoniam quietum est
 apud ipsam quod angulus non erit nisi secundum remotionem.
 Quantitates ergo visibilium non comprehenduntur nisi per dis-
 270 tinctionem et comparisonem. Comparatio autem per quam
 comprehenditur quantitas rei vise est comparatio basis pira-
 midis radialis, que est superficies rei vise, ad angulum pira-
 midis et ad quantitatem longitudinis pyramidis, que est remo-
 tio rei vise a visu. Et consideratio virtutis distinctivae non est
 275 nisi in parte superficiei membri sentientis in quem pervenit
 forma rei vise cum consideratione remotionis rei vise a super-
 ficie visus, quoniam quantitas partis in quam pervenit forma
 nunquam erit nisi secundum quantitatem anguli quem respicit
 illa pars apud centrum visus. Et non est inter remotionem rei
 280 vise a superficie visus et remotionem eius a centro visus in
 maiori parte diversitas operans in remotionem.

[3.144] Et etiam iam declaratum est quod sentiens com-
 prehendit verticationes que sunt inter centrum visus et rem-
 visam, que sunt verticationes linearum radialium, et compre-
 285 hendit verticationum ordinationem, et ordinationem visibilium,
 et ordinationem partium rei vise. Et cum sentiens comprehen-
 dit hoc, virtus distinctiva comprehendit quod iste verticatio-
 nes, quanto magis elongantur a visu tanto, magis ampliabuntur
 spatia que sunt inter earum extremitates. Et ista intentio iam
 290 etiam quietata est in anima, et cum hoc quietum est etiam in ani-
 ma quod linee radiales, quanto magis elongabuntur a visu,

259 res ... elongatur (260): elongatur res visa R 260 post visu¹ add. ex EP3 (scr. et del. E)/post tanto add. magis R/post diminuitur scr. et del. distinctiva S 261 est² inter. L3
 262 distinctione: diffinitione EP3; anima R; corr. ex diffinitione C1ErL3S (a. m. C1ErS)/
 post pervenit scr. et del. fi S 264 erit: erunt C1Er/et om. S 265 distinxerit:
 distinguet R 267 in om. R; inter. P1 269 ergo: igitur P1 272 superficies:
 superficiei EP3 275 quem: quam EP3R; alter. in quam a. m. S 276 cum ... vise
 inter. L3 282 iam om. P1S 285 verticationum corr. ex verticationem C1P1
 286 partium inter. a. m. E/comprehendit (287): comprehenderit L3P3 288 tanto
 ... visu (291) nig. a. m. E/ampliabuntur: ampliantur R 290 cum hoc: praeterea R/
 est² om. Er

- tanto magis erit res visa que est apud earum extremitates maior. Cum ergo visus comprehenderit aliquam rem visam, et comprehenderit terminos eius, comprehendet verticationes ex
 295 quibus comprehendit terminos illius rei vise. Et verticationes ex quibus comprehenderit terminos rei vise sunt lineae continentes angulum qui est apud centrum visus quem respicit illa res visa, et sunt lineae continentes locum visus in quem pervenit forma rei vise. Cum ergo visus comprehenderit verticationes,
 300 ymaginabit virtus distinctiva extensionem istarum linearum a centro visus usque ad terminos rei vise. Et quando cum hoc comprehenderit quantitatem remotionis rei vise, ymaginabit quantitatem longitudinum istarum linearum et quantitatem spatii quod est inter extremitates earum, et spatia que sunt
 5 inter extremitates istarum linearum sunt dyametri rei vise. Et quando virtus distinctiva ymaginabit quantitatem anguli, et quantitatem longitudinum linearum radialium, et quantitatem spatiorum que sunt inter extremitates earum, comprehendet quantitatem rei vise secundum suum esse.
- 10 [3.145] Verticationes autem que extenduntur inter centrum visus et terminos cuiuslibet rei vise comprehense a visu comprehenduntur a sentiente et a virtute distinctiva, et sentiens et virtus distinctiva comprehendunt quantitatem partis visus in qua pervenit forma illius rei vise. Et cum virtus distinctiva
 15 comprehenderit verticationes linearum radialium, comprehendet situs eorum adinvicem, et comprehendet appropinquationem et remotionem earum adinvicem, et comprehendet qualitatem extensionis earum. Et nichil remanet quo completur comprehensio magnitudinis rei vise nisi quantitas remotionis
 20 rei vise.

292 magis *om.* R/que est *om.* R/earum: eorum EP3/extremitates *corr.* ex extremitatem L3/maior: minor EP3R; *corr.* ex minor a. m. C1 295 comprehendit: comprehendet EP3R/illius *om.* R 296 comprehenderit: comprehendet EP3R; comprehendit L3P1
 300 ymaginabit: ymaginabitur C1EErP1P3R 1 terminos: terminum C1/cum hoc: simul R 2 remotionis rei vise: rei vise remotionis S/ymaginabit: ymaginabitur EP1P3R; *alter.* ex ymaginabili in ymaginabitur C1Er 3 post longitudinum *add.* sive quantitatem longitudinis EP3/et *inter.* L3 4 post earum *add.* est C1Er 5 extremitates: extremitas E 6 ymaginabit: ymaginabitur C1EErP1P3R 7 quantitatem²: quantitates Er 10 ante inter *add.* secundum suum esse L3 11 cuiuslibet *inter.* a. m. S/post visu *add.* et S/comprehenduntur (12): comprehenditur E 12 virtute *corr.* ex virtutes P3/et²... distinctiva (13) *inter.* L3 13 quantitatem *corr.* ex quantitates P1/post visus *scr.* et *del.* distinctiva comprehendit S 14 qua: quam P1RS/forma *om.* P1/illius *om.* P1S 15 comprehenderit: comprehendit P1S 16 eorum: earum EP3R/adinvicem: inter se R/post adinvicem *scr.* et *del.* et comprehendet situs eorum adinvicem S/post comprehendet² *scr.* et *del.* eo Er 17 et remotionem *om.* R/remotionem: remotionum P1/qualitatem (18): quantitatem EL3P3; *alter.* in quantitatem a. m. Er 19 nisi...vise (20) *om.* P1

[3.146] Et iam declaratum est in qualitate comprehensionis remotionis rei vise quod cuiuslibet rei vise remotio comprehenditur a visu aut certe aut estimatione. Et cum virtus distinctiva comprehenderit situs linearum radialium continentium terminos rei vise, et quantitatem partis que est inter ipsas et superficiem membri sentientis, que est quantitas anguli, et ymaginaverit cum hoc quantitatem remotionis rei vise, statim ymaginabit quantitatem anguli et remotionis in simul. Et cum ymaginaverit quantitatem anguli et quantitatem remotionis in simul, comprehendet quantitatem rei vise secundum quantitatem anguli et secundum quantitatem remotionis in simul. Et virtus distinctiva ymaginat quantitatem remotionis cuiuslibet rei vise comprehense a visu, et ymaginat verticationes continentes terminos eius, et per istam ymaginationem perveniet apud ipsam forma pyramidis continentis rem visam et quantitas basis eius que est res visa. Et sic perveniet illi quantitas rei vise.

[3.147] Et significatio quod comprehensio magnitudinis rei vise erit per comparisonem magnitudinis ad remotionem rei vise est quia visus, quando comprehenderit duo visibilia diverse remotionis et respicientia eundem angulum apud centrum visus—scilicet ut radii transeuntes per extrema primi illorum perveniant ad extrema secundi—et primum illorum non cooperuerit totum secundum, et comprehenderit visus remotionem cuiuslibet illorum comprehensione certificata, semper visibile remotius comprehendetur a visu visibili propinquiori maius. Et quanto magis visibile remotius elongabitur, et visus certificaverit quantitatem remotionis eius, tanto magis comprehendetur maius. Verbi gratia, quod quando visus aspexerit parietem remotum a visu remotione mediocri, et certificaverit

23 aut estimatione *corr.* ex estimatione aut S/estimatione: estimative C1Er 25 post ipsas *add.* lineas radiales EP3R; *inter.* lineas radiales L35 (a. m. S)/et superficiem (26): superficiei C1ErL35 26 ymaginaverit (27): imaginata fuerit R 27 cum hoc: simul R/ymaginabit (28): imaginabitur R 28 in om. R/ymaginaverit (29): imaginata fuerit R 29 quantitatem² om. R/in om. EP3R 31 in om. R 32 ymaginat: ymaginabit L3; imaginatur R/vise om. S; *scr.* et *del.* P1 33 ymaginat: imaginatur R 34 eius: illius EP3R/istam ymaginationem *transp.* EL3P3R/apud: ad R 35 forma: formam EL3P3/basis: lucis S 36 illi: ad illam R 37 significatio: significat Er; *corr.* ex significat a. m. C1/quod comprehensio *corr.* ex comprehensio quod C1/post comprehensio *scr.* et *del.* m P3 38 erit: fit R/post comparisonem *scr.* et *del.* m C1 39 post vise *scr.* et *del.* et E/est *inter.* L3 40 eundem: eiusdem S 41 ut om. P3 42 perveniant: pervenient L3/cooperuerit (43): cooperuit P1 43 totum secundum *transp.* P1/post et *add.* cum P1 45 remotius *corr.* ex remotionis L3 46 maius *corr.* ex magis C1/magis *alter.* in maius a. m. C1/magis . . . remotius: remotius . . . magis R/visibile remotius *transp.* EP3 48 ante maius *scr.* et *del.* visus E; *scr.* et *del.* mi P3/quod om. R/quando: non Er/visus: aliquis R 49 remotione mediocri: remodiocri P3

- 50 visus remotionem illius parietis et quantitatem eius, et certifi-
caverit quantitatem latitudinis eius, deinde apposuerit aspici-
ens manum uni visui inter visum et parietem et clausurit alter-
um oculum, inveniet tunc quod manus eius cooperiet portio-
nem magnam illius parietis. Et comprehendet quantitatem
55 manus eius in illa dispositione, et comprehendet quod quan-
titas cooperta a manu ex pariete est multo maior quantitate
manus eius, et visus comprehendet verticationes linearum
radialium, et comprehendet angulum quem continent lineae
radiales. Tunc ergo visus comprehendit quod angulus quem
60 respiciunt manus et paries est idem angulus, et tunc etiam
comprehendit quod pars cooperta manu eius est multo maior
manu. Et cum ita est, virtus distinctiva in illa comprehensione
comprehendit quod remotius duorum visibilium diverse remo-
tionis respicientium unum angulum est maioris quantitatis.
- 65 [3.148] Deinde, quando visus in illa dispositione auferetur,
et aspexerit alium parietem remotiorem illo pariete, et opposu-
erit manum eius inter visum et illum parietem, inveniet quod
illud quod cooperitur ex secundo pariete est maius illo quod
cooperitur ex primo. Et cum tunc aspexerit celum, inveniet
70 quod manus eius cooperiet medium illius quod apparet de celo
aut magnam portionem illius. Tamen aspiciens non dubitabit
quin manus eius nichil sit respectu eius quod cooperitur de celo
secundum sensum. Declaratum est ergo ex ista experimentati-
one quod visus non comprehendit quantitatem magnitudinis
75 rei vise nisi ex comparatione magnitudinis rei vise ad quantita-
tem remotionis eius cum comparatione ad angulum, non ex
comparatione ad angulum tantum. Et si comprehensio quanti-
tatis magnitudinis esset secundum angulum tantum, oppor-

50 parietis *corr. ex partis* L3 51 aspiciens (52) *om.* EP3R 52 inter visum *om.* Er
53 cooperiet *corr. ex cooperet* L3 54 comprehendet: comprehendit C1S/post
comprehendit *scr. et del.* quod P3 55 in *om.* EL3P3/illa: ista R 56 cooperta:
corporea P1/a *om.* L3 57 manus *corr. ex maius* S/post visus *add.* simul R
59 comprehendit: comprehendet R/quem *corr. ex quod* S 60 paries *corr. ex parietes*
L3 61 comprehendit: comprehendet P1R/pars: paries Er/post pars *add.*
parietis EP3R/pars cooperta *corr. ex paries coopertus* L3/cooperta: coopertus Er/post
cooperta *add.* cum E; *add.* a P3 62 ita *corr. ex in a. m.* C1/est: sit R/illa comprehensio
transp. L3 63 remotius: remotiones EErl3; remotionis S; *corr. ex remotiones a. m.* C1
65 visus: quis R/auferetur: visum suum averterit R 66 illo: alio P3/opposuerit
(67): apposuerit EP1P3 67 eius: suam R/et . . . parietem *om.* P3/illum *om.* P1
68 maius: magis Er 69 cum *om.* P3/cum tunc *transp.* L3 70 post cooperiet *scr.*
et del. manum P3/medium illius *corr. ex illius medium* P3/post quod² *scr. et del.* a C1
71 illius: eius EP3R/post illius *scr. et del.* quod apparet S 72 eius²: illius EP3R/
cooperitur: cooperuerit ER; cooperuit P3 73 declaratum: determinabitur EP3R;
declarabitur ErL3 76 post angulum *scr. et del.* et Er/non . . . angulum (77) *inter.* L3;
om. P1 77 comprehensio *corr. ex comprehensione* S 78 ante esset *add.* eius EP3/
esset . . . angulum *inter.* L3

teret ut duo visibilia diverse remotionis respicientia unum an-
 80 gulum apud centrum visus viderentur equalia, et non est ita.
 Quantitas ergo magnitudinis rei vise non comprehenditur per
 distinctionem nisi ex ymaginatione pyramidis continentis rem
 visam a virtute distinctiva, et ex ymaginatione quantitatis
 anguli pyramidis cum ymaginatione longitudinis pyramidis, et
 85 ex comparatione basis pyramidis ad quantitatem anguli eius et
 ad quantitatem longitudinis eius in simul. Et hec est qualitas
 comprehensionis magnitudinis.

[3.149] Et propter multitudinem consuetudinis visus in
 distinctione remotionum visibilium, quando senserit formam et
 90 remotionem rei vise, statim ymaginabit quantitatem loci forme
 et quantitatem remotionis, et comprehendet ex congregatione
 duarum istarum intentionum magnitudinem rei vise. Sed ta-
 men quantitates remotionum visibilium sunt collocate sub
 magnitudinibus que comprehenduntur a visu. Et iam predic-
 95 tum est quod quedam quantitates remotionum visibilium com-
 prehenduntur certe et quedam estimative, et quod illa que
 comprehenduntur estimative comprehenduntur assimilatione
 remotionis rei vise ad remotiones sibi similium ex visibilibus
 certificate remotionis, et quod remotiones certificate quantita-
 100 tis sunt ille que respiciunt corpora ordinata et continuata. Et
 ex comprehensione corporum ordinatorum continuatorum res-
 picientium ipsas a visu et ex certificatione quantitatum illorum
 corporum erit certificatio quantitatum remotionum visibilium
 que sunt apud extremitates eorum. Remanet ergo ad declaran-
 105 dum quomodo visus comprehendet quantitates remotionum
 visibilium respicientium corpora ordinata continuata et quo-
 modo certificat quantitates corporum ordinatorum continua-
 torum respicientium remotiones visibilium.

[3.150] Corpora ergo ordinata continuata respicientia

79 respicientia: super P3 (*inter.*); *corr.* ex respicientis a. m. E 83 ex *inter.* S 84 cum
 . . . pyramidis *om.* P1R 86 in *om.* R/qualitas: equalitas EErP1P3; *corr.* ex equali-
 tas L3 87 post magnitudinis *scr.* et *del.* eius P1 88 multitudinem: similitudinem
 P1/consuetudinis: assuetudinis EErL3P3 90 rei *om.* S/yimaginabit: imaginabitur R
 92 duarum istarum *transp.* EP3R 93 sub: in P1; *corr.* ex in L3S (a. m. S)/post sub *scr.*
 et *del.* vel in C1 94 magnitudinibus *corr.* ex magnitudinis S 95 post quod *add.*
 vis P3/remotionum *corr.* ex motionum a. m. E 96 certe . . . comprehenduntur² (97)
mg. a. m. S/illa: illae R 97 post comprehenduntur² *add.* ex Er/assimilatione: a
 similitudine EL3P3R; *alter.* ex assimilative in ex assimilatione a. m. C1 98 post ad
add. intentiones P3/remotiones: remotionis P3/similium *corr.* ex visibilium S
 99 post et *scr.* et *del.* quedam P1 100 respiciunt *corr.* ex recipiunt L3/et¹ *om.* Er; *inter.*
 a. m. E 104 eorum *om.* P1S; *mg.* a. m. C1/ad *om.* R 105 comprehendet:
 comprehendit Er; comprehendat R; *corr.* ex comprehendendum P1 107 certificat:
 certificet R 108 post visibilium *scr.* et *del.* sunt in maiori parte S 109 ordinata
corr. ex ordinate L3

110 remotiones visibilium sunt in maiori parte partes terre. Et
visibilia assueta que semper comprehenduntur a visu et fre-
quentius sunt superficies terre, et corpus terre interiacet ipsa et
corpus hominis aspicientis. Et quantitates partium terre inter-
115 respicientium remotionem istorum visibilium a visu semper
comprehenduntur a visu. Et comprehensio quantitatum par-
tium terre interiacentium aspicientem et visibilia que sunt su-
per faciem terre non est nisi ex mensuratione illarum adinvicem
a visu et ex mensuratione partium terre remotarum ab eo ad
120 partes terre propinquas illi quarum quantitates sunt certifi-
cantes. Deinde ex frequentatione comprehensionis partium terre
ab eo et ex frequentatione mensurationis illarum ab eo compre-
hendet quantitates partium terre que sunt apud pedes per cog-
nitionem et per assimilationem illarum ad eis similes iam prius
125 comprehensas. Visus ergo, quando aspexerit partem terre
interiacentem ipsum et rem visam, cognoscet quantitatem eius
propter frequentationem comprehensionis similium illi parti
terre. Et ista intentio est ex intentionibus quas sentiens ad-
quirit a principio crescentie. Et sic pervenient quantitates
130 remotionum visibilium assuetorum figurate in ymaginatione et
quiete in anima ita quod homo non percipit qualitatem quies-
centie earum.

[3.151] Quomodo vero est principium comprehensionis
partium terre inter ipsum et visibilia est secundum quod
135 narrabo. Principium earum cuius quantitas certificabatur a

111 que om. ErS; mg. a. m. C1 112 sunt om. C1S/post terre² inter. quod a. m. Er/post
interiacet add. inter R 113 interiacentium (114) corr. ex interiacentem C1 114 ante
aspicientem add. inter R/aspicientem: aspicientium L3; aspicientes P1/et om. L3P1S;
inter. a. m. C1/faciem: superficiem L3P3; corr. ex superficiem a. m. Er 115 res-
picientium: respicientes R/remotionem: remotiones Er/semper comprehenduntur (116)
transp. L3 116 quantitatum: quantitatis P1 117 post interiacentium add. inter
R/super faciem (118): superficiem L3; corr. ex superficiem a. m. Er 118 adinvicem:
inter se R 119 post visu scr. et del. et ex mensuratione illarum adinvicem a visu S
120 certificantes (121): certificate P3R; corr. ex certificate a. m. E 122 ab eo^{1,2}: a visu
R/ex om. Er 123 ante quantitates add. visus R/quantitates: quantitatem EL3P3R/
apud om. Er 124 per om. C1EP3R/ante illarum scr. et del. eorum P1/ad eis: per R
125 ergo om. P1/aspexerit: inspexerit P3 126 ante ipsum add. inter R; add. et S/post
visam add. et S/cognoscet: comprehendet Er; cognoscit P1 128 post ex add.
illis EP3R 129 post principio scr. et del. quiescentie vel C1/crescentie: quiescentie
P1R; corr. ex quiescentie a. m. S/sic om. L3 130 ymaginatione: imaginationem R
131 quiete: quietem R/ita om. P3/quod: ut R/percipit: percipiat R/quiescentie (132)
corr. ex quiescie L3 132 ante earum mg. vel quantitatem quiescentem a. m. E
133 quomodo: unde R/vero est transp. L3/est: sit R/est principium transp. P3
134 post terre add. interiacentium C1EErL3P3R (mg. a. m. C1)/ipsum: visum P3
135 principium: primum Er/earum: eorum P3; eius R; corr. ex eorum a. m. E/
certificabatur: certificabitur Er; certificatur R

visu est illud quod est apud pedes, quoniam quantitas illius
quod est apud pedes comprehenditur a visu et a virtute
distinctiva. Et virtus certificatur ipsam per mensuram corporis
hominis, quoniam illud quod est apud pedes semper mensura-
140 tur ab homine sine intentione per pedes eius, quando ambulat
super ipsum, et per brachium eius, quando extenditur manus
ad ipsum. Et omne quod est prope hominem ex terra semper
mensuratur per corpus hominis, et sine intentione, et visus
comprehendit istam mensurationem et sentit ipsam. Et virtus
145 distinctiva comprehendit istam mensurationem, et intelligit
ipsam, et certificatur ex ea quantitates partium terre continua-
tarum cum corpore hominis. Quantitates ergo partium terre
propin quarum homini iam sunt intellecte apud sentientem et
apud virtutem distinctivam, et iam forme earum sunt ymagi-
150 nate apud virtutem distinctivam et quiete in anima. Et visus
comprehendit istas partes terre semper, et sentiens sentit
verticationes que extenduntur a visu ad extremitates istarum
partium apud comprehensionem illarum a visu et apud con-
siderationem corporis terre a visu, et comprehendit partes
155 superficiei membri sentientis in quas perveniunt forme istarum
partium terre, et comprehendit quantitates partium visus et
quantitatem angulorum quos respiciunt iste partes visus. An-
guli ergo quos respiciunt partes terre propinque homini intelli-
guntur apud sentientem secundum transitum temporis, et for-
160 me eorum sunt ymagine in anima. Et quantitates longitudi-
num linearum radialium que extenduntur a centro visus ad
extremitates partium terre propin quarum homini comprehen-
duntur a sentiente et a virtute distinctiva, et certificantur ab
ea, quoniam longitudines istarum verticationum semper men-
165 surantur per corpus hominis sine intentione. Si ergo homo fue-
rit erectus et aspexerit terram apud pedes eius, erunt longi-

136 est apud pedes: apud pedes est Er 138 post et scr. et del. virtus vel C1/virtus:
visus C1EL3P3R; alter. in visus a. m. S 139 post est add. ex terra EEEL3P3R/semper:
super P3S/mensuratur (140): mensuram EP3 141 super ipsum om. C1P1S/per om.
P1/extenditur: extendit EEEL3P3R/post extenditur scr. et del. ? Er 142 ex terra: extra
S/terra: certa P1 143 corpus corr. ex corporis S/et¹ om. C1EEEL3P3R 144 men-
surationem: mensuram EP3R 145 post istam add. mensuram vel EP3/
mensurationem: mensuram R 147 cum corr. ex et a. m. E 149 et... distinctivam
(150) mg. a. m. C1/earum corr. ex illarum Er/sunt ymagine (150) om. P3/ymagine
(150): conceptae R 150 et: sunt P3/quiete: virtute P1 154 corporis: partium P1
155 superficiei corr. ex super situm a. m. C1/perveniunt: pervenerint P1 156 visus
om. R 157 quantitatem: quantitates R 158 ergo: vero P1R 159 sentientem:
membrum sentiens R 160 ymagine: conceptae R 163 certificatur:
certificatur EL3 164 post quoniam add. vero R/verticationum corr. ex intentio-
num P1 166 et om. P3/erunt inter. a. m. Er

tudines linearum radialium secundum quantitatem erectionis
hominis, et virtus distinctiva intelliget certe quod remotio
interiacens visum et partem terre est quantitas erectionis
170 hominis.

[3.152] Et longitudes locorum terre continuatorum cum
corpore hominis sunt intellecte et percepte quantitates apud
virtutem distinctivam, et forme earum sunt quiete in anima.
Cum ergo visus aspexerit partem que est apud pedes, statim
175 sentiens comprehendet verticationes pervenientes ad extremi-
tates illius partis, et ymaginabit virtus distinctiva quantitates
longitudinum verticationum pervenientium ad extremitates
earum et quantitates angulorum quos continent ille verticatio-
nes. Et cum virtus distinctiva ymaginaverit quantitates lon-
180 gitudinum verticationum et quantitates angulorum quos con-
tinent verticationes, comprehendet quantitatem spatii que est
inter extremitates illarum verticationum certa comprehensione.
Secundum ergo hunc modum certificantur quantitates partium
terre continentium aliquam partium terre per sensum visus.

185 [3.153] Deinde quantitates partium terre sequentium istas
partes in remotione comprehenduntur a visu ex comparatione
quantitatum partium linearum radialium que extenduntur ad
extremitates earum ad quantitates radialium que extenduntur
ad primas partes que sequuntur hominem. Et sic comparat
190 virtus distinctiva lineas radiales tertio loco venientes ad radios
secundos communes prime parti et secunde, et percipit quanti-
tatem augmentationis tertii radii super secundum. Et cum hoc
senserit, sentiet quantitatem tertii radii, et ipse comprehendet
quantitatem secundi radii certa comprehensione. Erunt ergo
195 duo radii continentes partem secundam terre note quantitatis
apud virtutem distinctivam, et similiter erit situs eorum notus
apud ipsam. Et cum comprehenderit longitudinem duorum

169 *post interiacens add. inter R* 171 *et inter. a. m. Er/et . . . hominis (172) mg. a. m. S/post et inter. sic a. m. C1/terre om. L3* 172 *sunt om. P3* 173 *earum: eorum ErR*
174 *ergo: igitur P1* 175 *comprehendet: comprehendit P1/pervenientes alter. in*
pertinentes a. m. S/ante ad scr. et del. vel pertinentes C1 176 *ymaginabit: imagina-*
bitur R 177 *pervenientium: provenientium P1* 179 *ante et scr. et del. n C1/*
ymaginaverit: imaginata fuerit R 184 *continentium . . . terre om. EEerL3P3R; scr. et*
del. C1 185 *terre om. EL3P3R* 189 *post ad scr. et del. extremitas P1/post et scr.*
et del. et Er 191 *secundos: secundo EEerL3P3R/post secundos add. venientes EL3P3R*
192 *radii om. P1/secundum corr. ex tertium a. m. E/hoc om. R* 193 *post senserit scr.*
et del. senserit P1/radii om. L3/ipse: ipsa Er; alter. in ipsa C1L3 (a. m. C1)/comprehendet:
comprehendit Er 194 *secundi corr. ex tertii a. m. E/comprehensione:*
comprehensionem Er 195 *partem secundam transp. EL3P3R/quantitatis: quanti-*
tates L3 196 *eorum notus corr. ex earum notus P3* 197 *cum inter. P1/duorum:*
duarum Er

200 radiorum et situm eorum, comprehendet spatium quod est
inter extremitates eorum certa comprehensione. Secundum er-
go hunc modum comprehendet virtus distinctiva etiam quan-
titates partium terre sequentium partes continentes pedes.

[3.154] Et etiam partes sequentes partes continentes pedes
semper etiam mensurantur per corpus hominis. Quoniam,
quando homo ambulaverit super terram, mensurabitur terra
205 super quam ambulat per pedes eius et passus, et comprehendet
virtus distinctiva quantitatem eius. Et cum homo pertransierit
locum in quo fuit et partes continuatas cum pedibus eius, et
pervenerit ad illas partes sequentes, mensurabuntur etiam iste
partes sicut mensurabantur etiam priores, et comprehendet
210 etiam sequentes sicut comprehendebat priores. Et ista
comprehensio erit certificata sine dubio, et sic certificabitur ab
eo per comprehensionem istam secundam prima comprehensio.
Si ergo quantitas eius non fuerit primo certificata, certificabitur
secundo. Et ista commensuratio comprehenditur a sentiente
215 semper, et utitur ipsa sine intentione sollicita, sed aspecta aliqua
partium terre a visu, comprehendit sentiens et virtus distinctiva
istam mensurationem per viam accidentalem sine intentione.
Deinde propter frequentationem istius intentionis sunt iam
certificate quantitates partium terre sequentium pedes et quan-
220 titates eorum que sequuntur ipsas. Secundum ergo hunc
modum acquirit sentiens et virtus distinctiva quantitates
partium terre continentium hominem interiacentium visum et
visibilia, et ista adquisitio est in principio crescentie hominis.
Deinde adquiescunt quantitates remotionum visibilium
225 assuetorum que sunt super faciem terre apud sentientem et
apud virtutem distinctivam. Erit ergo comprehensio
remotionum visibilium assuetorum que sunt super faciem terre

199 certa *om.* P3 200 etiam: secundum L3 202 partes² *inter. a. m.* E 203 eti-
am *om.* R/post per *scr. et del.* partes P1 204 ambulaverit *corr. ex* ambularet P1
205 ambulat: ambulabat C1/comprehendet (206): comprehendit S 207 locum *om.*
P1/fuit: fuerit C1EP3R 209 iste: ille EP3R; ipse P1/post partes *add.* sequentes
EP3R/etiam² *om.* P1 210 ante etiam *add.* et P3/etiam *om.* Er 212 com-
prehensionem istam *transp.* P3 213 non *om.* P3; *scr. et del.* E/primo certificata *transp.*
R/post primo *add.* non S 214 ista commensuratio *transp.* P3/commensuratio *corr.*
ex mensuratio S 215 intentione: interisione P3; *corr. ex* intercisione *a. m.* E
216 aliqua *om.* Er 217 accidentalem *mg. a. m.* C1 218 ante sine *add.* quia per
ambulationem accidentalem C1 (*scr. et del.* accidentalem) 220 que *om.* C1S/
sequuntur: sequitur P3; *corr. ex* sequitur S 221 quantitates (222): quantitatem P3
222 continentium *alter. in* contingentium *a. m.* C1/interiacentium *corr. ex* interiacci-
um P3 223 ante visum *add.* inter R/post principio *scr. et del.* quiescentie vel C1; *add.*
ad L3/crescentie: quiescentie EErP1R; *corr. ex* quiescentie L3S (*a. m.* S) 224 adqui-
escunt: quiescunt Er 225 super faciem: superficiem L3 227 visibilium *om.* L3

per cognitionem et assimilationem eorum adinvicem.

[3.155] Et est dicere comprehensionem quantitatum remotionum visibilium per adquisitionem a sentiente et a virtute distinctiva non quod ista comprehendit quot cubiti sunt in qualibet remotione; sed acquirit ex qualibet remotione et ex qualibet parte terre quantitatem ymaginatam et determinatam, et ad illas quantitates determinatas comparat quantitates remotionum visibilium quas comprehendit post. Et similiter acquirit ex cubito, et palma, et a qualibet quantitate mensurata quantitatem determinatam. Quando ergo aspiciens comprehenderit aliquod spatium et voluerit scire quot cubiti fuerint in eo, comparabit formam adquisitam ex ymaginatione ex illo spatio ad formam adquisitam in ymaginatione ex cubito, et comprehendet per istam comparisonem spatii quantitatem respectu cubiti.

[3.156] Et etiam ex assuetudine hominis est quod, quando voluerit certificare aliquam intentionem, frequentabit aspectum eius, et distinguet intentiones eius, et considerabit tempus, et per illud comprehendet illam intentionem secundum veritatem. Aspiciens ergo quando comprehenderit aliquam rem visam super faciem terre et voluerit certificare remotionem eius, intuebitur partem terre continuatam interiacentem ipsum et rem visam, et movebitur visus in longitudine ipsius. Et sic movebitur axis radialis super illam partem, et mensurabit ipsam, et comprehendet ipsam secundum singulares partes, et sentiet partes eius parvas quando remotio illius ultimi spatii fuerit mediocris. Et quando visus comprehenderit partes terre et comprehenderit partes parvas, comprehendet virtus distinctiva quantitatem totius spatii, quoniam per motum axis radialis super spatium certificabit virtus distinctiva quantitatem

228 *post et add. per EErP3* 229 *comprehensionem corr. ex comprehensio a. m. S*
 230 *ante per add. esse R* 231 *post quod add. per R/comprehendit: comprehenduntur*
C1S; comprehendant EP1P3; comprehendunt ErL3; comprehendat R/ante quot add.
aspiciens R/sunt: sint R 232 *remotione² . . . qualibet (233) om. P1/ex² om. S*
 233 *ymaginatam om. R; corr. ex ymaginate L3/et om. EL3P3R* 236 *palma: palmo R/*
a om. L3/mensurata (237): mensurativa C1Er; corr. ex mensurativa L3; alter. in
mensurativa a. m. S 238 *voluerit: voluit C1* 239 *ex¹: in Er* 240 *in: cum L3;*
alter. in cum a. m. E 243 *ex om. P1* 244 *frequentabit: iterabit R* 245 *eius¹:*
suum R/intentiones: intentionem P1/post et² scr. et del. considerationem P1/post tem-
pus scr. et del. eius S 246 *illam intentionem transp. L3* 248 *super faciem:*
superficiem L3 249 *ante ipsum add. inter R* 252 *ipsam mg. a. m. C1/singulares:*
singulas EL3P3R 253 *partes eius transp. P3/illius ultimi transp. Er* 254 *post*
visus scr. et del. fuerint ita quod cum E 255 *partes parvas corr. ex parvas partes Er*
 256 *totius: illius C1P1S/post totius scr. et del. corporis P1* 257 *quantitatem:*
quantitate P1

partis visus in quam pervenit forma illius spatii, et quantita-
 tem anguli quem respicit illud spatium, et quantitatem longi-
 tudinis radii qui extenditur ad ultimum spatii. Et cum iste due
 260 intentiones certificabuntur a virtute distinctiva, certificabitur
 quantitas partis terre vise. Et similiter quantitates longitudi-
 num corporum elevatorum a terra extensorum in parte remota,
 sicut parietum et montium, comprehenduntur a visu sicut com-
 265 prehenduntur quantitates partium terre, et comprehendet re-
 motiones visibilium respicientium ipsas ex comprehensione
 quantitatum longitudinum earum. Secundum ergo hunc mo-
 dum certificat visus quantitates remotionum visibilium que
 fuerint in remotionibus mediocribus et fuerint respicientia
 270 corpora ordinata continuata.

[3.157] Quedam autem visibilia que sunt super faciem terre
 habent remotionem mediocrem, et quantitates partium terre
 interiacentium visum et ipsa sunt quantitates mediocres. Et
 quedam sunt quorum remotio est maxima et extra mediocri-
 275 tatem, et quantitates partium terre interiacentium visum et
 ipsa sunt extranee magnitudinis. Et quantitates partium terre
 comprehenduntur a visu secundum modos quos narravimus.
 Illud ergo eorum quod est propinquum et mediocris quantitatis
 comprehenditur et certificatur a visu, et quod est ex eis extra-
 280 nee remotionis non certificatur a visu quantitas eius. Quoniam
 visus, quando consideravit spatia, comprehendit quantitates
 eorum dum senserit augmentationem longitudinis radii, et dum
 senserit angulos quos respiciunt partes parve partium spatii
 apud motum axis super spatium. Et certificabit quantitatem
 285 spatii dum senserit parvam augmentationem in longitudine
 radii et augmentationem parvam in angulo quem respicit spa-

258 partis visus: totius spatii L3/post visus add. in oculo C1S (inter. a. m. S)
 259 quem: quam P3 260 qui: que Er 261 certificabuntur inter. L3 262 partis
 om. L3/terre: rei Er/quantitates: quantitas P1/longitudinum (263) inter. L3 263 in
 ... remota inter. L3 264 parietum: iotum L3 265 partium corr. ex spatium L3/
 comprehendet: comprehenduntur R/remotiones (266) alter. in intentiones a. m. E
 268 remotionum: remotionis L3/que: quando EErL3P3R; alter. in quando C1S (a. m. S)
 269 in: ex EErL3P3R; alter. in ex C1S (a. m. S) 271 super faciem corr. ex super-
 faciem S 272 partium: spatium L3 273 ante visum add. inter R/quantitates
 ... sunt (276) nig. a. m. E 275 interiacentium: interiacium P3/ante visum add.
 inter R 278 eorum om. R; inter. a. m. E 279 post et² add. quantitas eius R/
 ex eis om. R/ex eis extranee (280): extranee ex eis L3 280 quantitas: quantitatis P3;
 om. R/eius om. R 281 post quando scr. et del. certifica L3/consideravit: considera-
 verit C1L3S; comprehendit P3; comprehenderit R; alter. ex comprehenderit in
 consideraverit a. m. E/post spatia add. et Er/comprehendit: comprehendet EErL3P3R
 282 eorum: eorumdem EP3R/dum¹ inter. a. m. E 284 axis om. S 286 parvam
 inter. a. m. E

tium. Et cum remotio fuerit maxima, non sentiet augmentatio-
nem parvam in longitudine radii, nec sentiet motum radii super
parvam partem spatii cuius remotio est maxima, nec sentiet
290 angulum quem respicit parva pars remotionis maxime, nec cer-
tificabit longitudinem radii pervenientis ad extremum spatii,
nec certificabit quantitatem anguli quem respicit spatium illud.
Et cum non certificaverit longitudinem radii pervenientis ad
extremum spatii, nec certificavit quantitatem anguli quem res-
295 picit spatium, non certificabit quantitatem spatii.

[3.158] Et etiam, quando remotio fuerit maxima, partes
parve que sunt in ultimo spatii non comprehenduntur a visu
nec distinguuntur ab eo, quoniam parva quantitas in remotione
maxima latet visum. Cum ergo axis radialis movebitur super
300 spatium remotum maximum et perveniet ad remotionem maxi-
mam, transibit partem parvam spatii, et non sentiet sentiens
motum eius, quoniam pars parva in remotione maxima non
facit angulum sensibilem apud centrum visus. Cum ergo axis
radialis movebitur super spatium remotum, et senserit visus
5 quod ipse iam transierit partem aliquam spatii, quantitas illius
partis quam transivit non erit quantitas quam comprehendit
per sensum, sed erit maior. Et quanto magis augmentabitur
remotio spatii, tanto magis erunt partes latentes visum apud
ultimum spatii, et super quas latet motus radii visus, erunt
10 scilicet maiores. Quantitates ergo remotionum maximarum que
sunt super faciem terre non certificantur a visu, quoniam non
certificat quantitatem longitudinis radii pervenientis ad ulti-
mum earum nec quantitatem anguli quem respicit spatium
illud.

15 [3.159] Et etiam sentiens sentit certificationem quantitatis
spatii, quoniam visibile propinquum visui in remotione medio-
cri est magis certe visionis, scilicet, quia forme eorum sunt

287 remotio corr. ex remom P3/augmentationem (288) corr. ex argumentationem S
288 radii om. EP3/super: propter EL3P3R 289 spatii corr. ex radii E/est om. S
292 illud: istud L3 294 nec: et non R/certificavit: certificabit EP3; certificaverit L3R
295 post spatium inter. illud a. m. C1; rep. illud (292) . . . spatii (295) EL3P3 (certificavit:
certificaverit)/post spatii scr. et del. in C1 297 post parve add. spatii EErl3P3R/non
inter. S 298 post remotione scr. et del. ma C1 299 axis inter. L3 300 maxi-
mum: maxime R 1 partem parvam transp. Er 2 pars om. P3/pars parva transp.
ER/post remotione add. eius P3 4 post radialis scr. et del. motu P1 5 partem
aliquam transp. C1R/quantitas corr. ex quantitatis S 6 post partis add. spatii P3R/
quam transivit nig. a. m. E 8 erunt om. R/latentes: latebunt R 10 scilicet
om. R 12 pervenientis corr. ex pervenientes P1 13 post earum scr. et del. nec
quantitatem longitudinis radii pervenientis ad ultimum earum S/quem: quam Er/
spatium illud (14) transp. ErL3P3R 15 certificationem: vericationem L3
16 visibile: visibilem E; corr. ex visibilem P3/in . . . mediocri (17) om. R 17 magis
certe: certioris R/quia forme transp. P1/eorum: visibilium propinquorum R

- manifestiores et comprehenduntur a visu manifestiori compre-
 20 hensione. Et color et lux eorum sunt manifestiores, et situs
 superficierum eorum apud visum, et situs partium eorum, et
 forma partium eorum et partium superficierum sunt manifes-
 tiores visui. Et si in eis fuerit lineatio aut pictura aut partes
 parve, apparebunt visui manifestius. Et non est ita de visi-
 bilibus maxime remotionis. Quoniam res visa, quando fuerit in
 25 remotione maxima, non certificabit visus formam eius secun-
 dum suum esse, et dubitabit in colore, et luce, et forma super-
 ficierum eius, et nichil apparebit in ea ex subtilibus intentioni-
 bus et ex partibus parvis. Et ista intentio est manifesta sensui.
 Cum ergo visus comprehenderit aliquod spatium super faciem
 30 terre, statim postquam viderit ultimum eius et quedam visibilia
 in ultimo eius, sentiet quod illud spatium est ex spatiis medio-
 cribus aut ex spatiis maxime remotionis. Si vero certificaverit
 formam ultimi eius aut formam rei vise que est apud ultimum
 eius manifeste, et distinxerit cum hoc quantitatem illius spatii
 35 secundum modum predictum, tunc virtus distinctiva cum hoc
 comprehendet quod quantitas illius spatii est certificata ex
 comprehensione manifestationis forme ultimi eius aut forme rei
 vise que est apud ultimum eius. Si autem non certificaverit
 formam ultimi eius aut formam etiam rei vise que est apud ul-
 40 timum eius, non certificabit quantitatem illius spatii. Et cum
 hoc virtus distinctiva apud considerationem illius spatii com-
 prehendit quod etiam illud spatium non est certificate quanti-
 tatis propter latentiam forme ultimi eius aut forme rei vise que
 est apud ultimum eius.
- 45 [3.160] Quantitates ergo remotionum visibilium distinguen-

18 manifestiori: manifestiore R 20 eorum²: earum C1P1S 21 eorum: ea-
 rum C1P1S 22 in eis fuerit: fuerit in eis L3/post aut scr. et del. fig P3/pictura corr. ex
 figura E 23 manifestius corr. ex manifeste C1 24 ante maxime scr. et del. parve
 E/maxime remotionis transp. EP3R/quando: quae R 25 formam eius om. R
 26 et² om. EL3P1P3R 28 est manifesta transp. EErL3P3R/post manifesta add.
 visui L3 29 super faciem: superficiem Er 30 postquam: sentiet priusquam R/
 eius inter. L3 31 sentiet om. R/spatiis: partibus P1; spatibus S 33 ultimum mg.
 a. m. P3 34 cum hoc: etiam R; inter. a. m. S 35 cum hoc: etiam R 38 ultimum
 corr. ex ultimul S; si . . . eius (40) mg. a. m. E 39 aut: ad S/formam etiam transp. P1/
 etiam om. EErL3P3R 40 eius inter. L3/post spatii scr. et del. comprehendit quod S/
 cum hoc (41) om. R 41 illius: istius EP3R/post spatii add. simul R/comprehendit
 (42): comprehendet EErL3P3R 42 quod etiam transp. C1/etiam om. EErL3P3R/
 illud: istud EL3P3R/non est corr. ex est non L3/post non scr. et del. a S 43 ante rei scr.
 et del. non C1/rei om. S; mg. a. m. C1 44 eius scr. et del. P1/post eius scr. et del. si
 autem non certificaverit formam ultimi eius aut etiam formam rei vise que est apud
 ultimum eius non certificabit quantitatem illius spatii et cum hoc virtus distinctiva
 apud considerationem illius spatii comprehendit quod etiam illud P1 45 quanti-
 tates corr. ex quano P1/distinguuntur (46): distinguuntur EL3P3R

tur a visu, et qualitas comprehensionis quantitatum earum certificatur apud intuitionem, et quando aspiciens voluerit certificare quantitatem rei vise et certificare quantitatem remotionis rei vise, intuebitur remotionem et distinguet ipsam, et sic distinguetur ab eo remotio certificata a remotione non certificata. Et nichil est ergo ex remotionibus visibilium cuius quantitas sit certificata nisi remotiones respicientes corpora ordinata continuata, et cum hoc sunt remotiones mediocres. Quantitates ergo huiusmodi remotionum comprehenduntur a visu secundum modum quem declaravimus, et preter ista non certificantur a visu; sed existimantur et assimilantur, scilicet quia visus assimilat remotionem rei vise remotioni sibi similium ex visibilibus assuetis quorum quantitas remotionis est certificata iam ab eo. Et cum visus senserit iam latentiam forme rei vise propter remotionem, dubitabit in quantitate remotionis eius. Et remotio mediocris cuius quantitas certificatur a visu est remotio apud cuius ultimum non latet visum pars habens proportionem sensibilem ad totam remotionem. Et remotio mediocris respectu rei vise in qua visus comprehendit unam quantitatem rei vise est remotio mediocris apud cuius ultimum non latet pars illius rei vise habens proportionem sensibilem ad quantitatem rei vise quando visus intuebitur illam partem per se. Omne ergo spatium cuiuslibet partis longitudo, scilicet habens proportionem sensibilem ad quantitatem longitudinis spatii, comprehenditur a visu, et non latet visum ex partibus spatii que sunt apud ultimum eius nisi illud quod caret proportionem sensibili ad longitudinem illius spatii, et tale omne spatium est ex remotionibus mediocribus. Remotio autem que est extra mediocritatem in magnitudine est illa apud cuius ultimum latet quantitas habens proportionem sensibilem ad totam

46 *post quantitatum add. vel qualitatum EP3/earum om. P3/certificatur* (47): *certificantur P1S; corr. ex certificatur C1* 47 *intuitionem: intentionem EP1P3; corr. ex intentionem C1L3S (a. m. C1S)/ ante et add. vel intuitionem EP3* 48 *post vise scr. et del. intuebitur remotionem S* 50 *eo: ea P1S; corr. ex ipso C1/a . . . certificata om. P1* 51 *et om. EEerL3P3R/est ergo transp. R/remotionibus: intentionibus EP3R* 53 *cum hoc: cuius etiam R/sunt: sint C1P1S/sunt remotiones transp. R/mediocres: mediocris Er; inter. a. m. E/quantitates: corr. ex quantitata P3; alter. in quantitate a. m. S* 55 *non: que S* 56 *quia: quod EL3P3R* 57 *sibi om. Er* 58 *iam om. P3* 59 *vise inter. a. m. E* 61 *post visu scr. et del. et S* 64 *vise inter. L3/unam: veram EP3R; alter. in veram a. m. C1* 66 *pars inter. L3* 67 *visus: virtus P3/post visus add. intuetur P3/per inter. L3* 68 *ergo: igitur P1/post spatium add. cuius EEerL3P3 (inter. L3); add. in quo R/scilicet: est EEerL3P3; om. R* 69 *habens: habet R* 72 *spatii corr. ex spatiis P3; corr. ex spatium S/tale omne transp. EEerL3P3R* 73 *remotionibus mediocribus transp. P3* 74 *in inter. a. m. Er/post in add. longitudine vel EP3/magnitudine: longitudine R* 75 *proportionem corr. ex proportor P3*

illam remotionem. Et remotio que est extra mediocritatem respectu visus est illa in qua latet quantitas aliqua ex illa re visa habens proportionem sensibilem ad totam illam rem visam, aut latet aliqua intentio illius rei vise cuius latentia operatur in
80 latentiam quiditatis illius rei vise.

[3.161] Et etiam sentiens comprehendet quantitatem remotionis rei vise ex quantitate anguli quem respicit res visa. Quoniam, quando visus comprehenderit visibilia assueta que sunt in remotionibus assuetis, statim apud comprehensionem cognoscet ipsa visus, et quando visus cognoverit ipsa, cognoscet
85 quantitates magnitudinum eorum, quoniam quantitates magnitudinum eorum iam fuerunt certificate propter frequentationem comprehensionis cuiuslibet visibilium assuetorum, et iam sunt quiete in ymaginatione. Et visus, statim cum comprehendit
90 rem visam assuetam, comprehendit partem visus in qua pervenit forma illius rei vise quam respicit illa pars. Et cum sentiens comprehenderit illam quantitatem magnitudinis rei vise per cognitionem, et comprehenderit angulum quem tunc respicit illa res visa, comprehendet quantitatem remotionis illius
95 rei vise in illa dispositione, quoniam angulus quem respicit illa res visa non erit nisi secundum quantitatem remotionis. Et sicut sentiens recipit significationem super quantitatem magnitudinis et remotionem cum illo angulo, ita accipit significationem super quantitatem remotionis ex quantitate magnitudinis
100 cognite apud ipsam cum illo angulo. Quoniam illa magnitudo non respicit illum angulum nisi ex illa eadem remotione aut ex remotione equali illi, non ex omnibus remotionibus. Et cum sentiens comprehenderit quantitatem remotionis illius rei vise assuete multotiens et frequenter in horis in quibus illa res visa
105 respicit apud centrum visus simile illi angulo, et multotiens acceperat significationem super quantitatem magnitudinis illi-

76 illam om. L3/post et scr. et del. totum P3 77 post ex scr. et del. re visa S 80 latentiam: latentia EErL3P3/quiditatis: quiditas L3 81 comprehendet: comprehendit EErL3P3R; corr. ex comprehenduntur P1 82 post respicit add. illa EP3R 83 comprehendit: comprehendit L3R 85 post cognoscet add. ipsas EP3R 86 magnitudinum (87) om. L3P1; mg. a. m. E 87 fuerunt: fuerint L3P1P3; corr. ex fuerint E 88 comprehensionis cuiuslibet transp. EP3R 89 statim om. R/cum om. EP3; inter. L3/comprehendit: comprehendit EP3R 90 post assuetam add. statim R/qua: quam EErL3P3R 91 post cum scr. et del. senserit P1 92 illam om. EErL3P3R 96 visa inter. a. m. C1 97 recipit: respicit ErP1S/super: secundum P3 98 et: ex EP3R/post et inter. ex C1L3S (a. m. C1)/remotionem: remotione EP3; corr. ex remotione C1L3S (a. m. C1S) 100 apud ipsam corr. ex ipsam apud C1 101 illum: istum EP3; mg. C1L3 (a. m. C1)/angulum om. S; mg. a. m. C1/post angulum add. illa C1/aut ex remotione (102): vel C1L3P1S 102 illi corr. ex ei C1 104 assuete corr. ex assuei P3/post horis scr. et del. in horis P3 105 simile: similem R/illi inter. a. m. S 106 acceperat: accipit EP3; acceperit R/post acceperat inter. illam a. m. C1

us rei vise ex quantitate remotionis illius rei vise cum quantitate anguli qui est equalis illi angulo, virtus distinctiva intelliget quantitatem remotionis in qua comprehendit magnitudinem
 110 illius rei vise respectu illius anguli. Et cum virtus distinctiva intellexerit quantitatem remotionis illius rei vise respectu illius anguli, et comprehenderit in ista remotione magnitudinem illius rei vise respectu illius eiusdem anguli quando virtus distinctiva cognoverit illam rem visam, et cognoverit quantitatem magnitudinis eius quam ante comprehenderit, et comprehenderit statim quantitatem anguli quam tunc respicit illa res visa, cognoscet quantitatem remotionis secundum quam illa remotio respicit illum angulum. Sentiens ergo comprehendit quantitatem remotionum visibilium assuetorum ex comparatione anguli ad
 120 magnitudinem rei vise. Deinde propter frequentationem comprehendet sentiens remotionem rei vise assuete per cognitionem. Et erit quantitas anguli quem respicit res visa assueta apud comprehensionem eius cum cognitione illius rei vise signum super quantitatem remotionis illius rei vise, et plures
 125 remotionum visibilium assuetorum comprehenduntur secundum hunc modum. Et ista comprehensio non est in fine certificationis, tamen inter istam remotionem et remotionem certificatam non est maxima diversitas, et ex ista comprehensione opinati sunt mathematici quod magnitudo rei vise comprehenditur per angulum. Visibilia ergo assueta que sunt in
 130 remotionibus assuetis, quando visus comprehenderit ipsa et cognoverit quantitates remotionum istorum secundum istam viam, inveniet veritatem rei in maiori parte in quantitativis

107 ex . . . vise *inter. a. m. S* 108 illi *corr. ex illius Er* 110 et . . . anguli (112) *om. L3* 111 remotionis *om. EP1P3R* 112 comprehenderit: comprehendit *L3/illius om. L3R/illius rei vise (113): rei vise illius EErP3* 113 *post vise scr. et del. respectu illius rei vise S/quando . . . distinctiva om. R* 114 *ante cognoverit¹ add. et R* 115 comprehenderit¹: comprehendit *ErP1RS/et comprehenderit inter. L3/statim (116) om. R* 116 quantitatem *corr. ex magnitudinem P1/ante anguli add. illius EP3R/quam: quem EL3P3R* 118 ergo: igitur *P1* 119 remotionum: remotionis *P1/ex inter. a. m. Er/comparatione: operatione L3* 120 comprehendet (121): comprehendit *EErL3P3R* 122 res visa *transp. ErL3* 123 *ante eius add. anguli EL3P3R/post eius add. vel anguli eius C1S (inter. a. m. S)/illius corr. ex illis S/signum (124) . . . quantitatem (124) inter. L3* 124 remotionis . . . vise: illius rei vise remotionis *Er/illius . . . vise: rei vise L3 (inter.)* 125 remotionum: remotiones *EP3R/assuetorum om. S; mg. a. m. C1* 126 certificationis (127): certitudinis *EP3R* 127 tamen: cum *L3/istam remotionem transp. L3R* 128 *post est scr. et del. in fine certificationis S/diversitas corr. ex quantitas P3* 129 vise *om. ER; scr. et del. P3/comprehenditur (130): comprehendatur R* 130 *post angulum add. quando ergo visus comprehenderit R/ergo om. R/post que add. in Er* 131 quando *corr. ex quoniam L3P1/quando . . . ipsa om. R/comprehenderit: comprehendit EP3* 132 *post cognoverit scr. et del. ipsa S/istorum: ipsorum EP3; eorum ErL3/illorum R* 133 rei *om. R*

remotionum eorum, aut non erit inter illud quod comprehendit
 135 ex quantitatibus remotionum eorum et inter remotiones veras
 magna diversitas.

[3.162] In illo autem quod visus comprehendit ex quantita-
 tibus remotionum visibilium extraneorum que non frequenter
 comprehendit, visus erratur in maiori parte, et cum hoc forte
 140 inveniet aliquando in eo quod comprehendit ex quantitatibus
 earum secundum hunc modum. Secundum ergo istos modos
 quos declaravimus comprehenduntur quantitates remotionum
 visibilium per sensum visus.

[3.163] Et postquam declarata est qualitas comprehensio-
 145 nis quantitatum remotionum visibilium, et distincte sunt remo-
 tiones visibilium, distinguemus modo magnitudines visibilium
 que comprehenduntur a visu, et distinguemus comprehensio-
 nem illorum a visu. Dicamus ergo quod magnitudines quas
 comprehendit visus apud oppositionem sunt quantitates su-
 150 perficierum visibilium, et quantitates partium superficierum
 visibilium, et quantitates terminorum superficierum visibilium,
 et quantitates terminorum partium superficierum visibilium, et
 quantitates spatiorum que sunt inter terminos partium super-
 ficierum visibilium, et quantitates spatiorum que sunt inter
 155 visibilia distincta. Et isti sunt omnes modi quantitatum quas
 comprehendit visus apud oppositionem rei vise. Quantitas
 autem corporis rei vise non comprehenditur a visu apud oppo-
 sitionem, quoniam visus non comprehendit totam superficiem
 corporis apud oppositionem; et non comprehendit nisi illud
 160 quod sibi opponitur ex superficie corporis eius, quamvis cor-
 pus sit parvum. Et si visus comprehenderit corporeitatem
 corporis, non comprehendet quantitatem corporis eius, sed
 figuram corporeitatis tantum. Si ergo corpus fuerit motum, aut

134 eorum: ipsorum R/aut . . . eorum (135) *mg. a. m. S/inter illud corr. ex illud inter Er*
 135 *ex om. E/post eorum scr. et del. aut non erit inter illud quod comprehendit E/et . . .*
remotionum (138) mg. L3 139 *erratur: errat R/hoc om. Er* 140 *aliquando:*
aliquid R/in eo inter. a. m. E/comprehendit corr. ex comprehendet Er 141 *earum:*
eorum P1R 144 *post est scr. et del. quan P1* 145 *et . . . visibilium¹ (146) om. P3*
 146 *modo magnitudines: modos magnitudinis EL3P3/post visibilium² add. vel modos*
magnitudinis C1 148 *illorum: eorum C1P1; illarum R* 149 *comprehendit:*
comprehendet L3 150 *partium superficierum corr. ex superficierum partium P3*
 151 *visibilium¹ mg. L3* 152 *et¹ . . . visibilium om. EErP3R/terminorum om. L3/*
partium corr. ex spatium L3/post partium scr. et del. que sunt inter terminos L3
 154 *post visibilium rep. et² (152) . . . visibilium (154) EErP3 (post quantitates scr. et del.*
visibilium E/terminos partium: partes EP3)/post et add. spatia L3/quantitates inter.
a. m. S 156 *quantitas corr. ex quantitates S* 157 *post visu scr. et del. a visu S*
 159 *apud corr. ex aut S* 160 *post corporis add. aut ex superficiebus C1EerL3P3R (mg.*
a. m. C1)/eius inter. E/corpus (161) om. L3 161 *post sit inter. corpus L3* 163 *ergo:*
igitur P1/aut inter. L3

visus moveatur ita quod visus comprehendat totam superfici-
 165 em corporis per sensum aut per significationem, tunc virtus
 distinctiva comprehendet quantitates corporeitatis eius per
 secundam argumentationem preter argumentationem qua usa
 est apud visionem. Et similiter virtus distinctiva, cum com-
 170 prehendet quantitatem corporeitatis cuiuslibet partium cor-
 poris, non comprehendet ipsam nisi per argumentationem
 secundam preter argumentationem que est apud visionem.
 Quantitates ergo quas visus comprehendit apud oppositionem
 non sunt nisi quantitates superficierum et linearum quas deter-
 minavimus tantum.

175 [3.164] Et iam declaratum est quod comprehensio magni-
 tudinis non est nisi ex comparatione basis pyramidis radialis
 continentis magnitudinem ad angulum pyramidis qui est apud
 centrum visus et longitudinem pyramidis, que est remotio mag-
 nitudinis rei vise. Et iam declaratum est quod quedam remo-
 180 tiones visibilium sunt certificate, et quedam estimate. Magni-
 tudines autem visibilium quorum est remotio certificata com-
 prehenduntur a visu ex comparatione magnitudinum earum ad
 angulos quos respiciunt ille magnitudines apud centrum visus
 et ad remotiones eorum certificatas. Comprehensio ergo quan-
 185 titatum remotionum huiusmodi visibilium erit comprehensio
 certificata. Quantitates autem remotionum visibilium quorum
 remotio est estimata et non certificata comprehenduntur a visu
 ex comparatione magnitudinis eorum ad angulos quos respici-
 unt ille magnitudines apud centrum visus et ad remotiones
 190 earum estimatas et non certificatas. Comprehensio ergo quan-
 titatum remotionum huiusmodi visibilium erit comprehensio
 non certificata. Cum ergo sentiens voluerit certificare quanti-
 tatem magnitudinis alicuius rei vise, movebit visum super suos
 dyametros, et sic movebitur axis radialis super omnes partes
 195 rei vise. Si ergo remotio rei vise fuerit ex remotionibus maxi-
 mis, statim apparebit sensui latentia forme eius, et manifes-
 tabitur sentienti quod quantitas eius non est certificata. Et si

164 quod: ut R/visus comprehendat *transp.* EP3R 167 preter: propter P1/preter
 argumentationem *inter. a. m. S/usa: visa L3; corr. ex visa S* 168 *post* similiter *add.*
 cum EL3P3; *add.* si R/cum *om.* EEerL3R 172 quantitates *corr. ex* quantitas L3
 175 declaratum: determinatum L3 176 *ex corr. ex per a. m. Er* 177 magnitudinem
corr. ex magnitudine P3/qui: quod C1S; que L3 179 rei vise *transp.* C1Er/iam *om.*
 P1/quod *om.* Er 181 est remotio *transp.* EEerL3P3R 184 et *om.* L3 186 autem:
 ergo L3 187 remotio *om.* P1 190 *post* ergo *scr. et del.* radiorum P1
 191 huiusmodi visibilium *transp.* EL3P3R 192 ergo: igitur P1 193 movebit:
 removebit P3/suos: illius R; *corr. ex* duos P1 195 si... vise *mg.* L3 197 *ante* quod
add. et P1/et si: si vero R

remotio rei vise fuerit ex remotionibus mediocribus, statim
 apparebit sensui verificatio visionis eius. Si ergo axis radialis
 200 moveatur super illud quod est huiusmodi visibilium, mensura-
 bit ipsum vera mensuratione, et comprehendet partes eius, et
 certificabit quantitates partium eius. Et per motum certificabit
 quantitates partium superficiei membri sentientis in qua per-
 venit forma illius rei vise et quantitatem anguli pyramidis quem
 205 respicit illa pars. Et cum voluerit certificare remotionem eius
 super corpus respiciens remotionem eius, et per motum certifi-
 cabit quantitatem corporis respicientis remotionem eius que est
 equalis secundum sensum longitudinibus linearum radialium.
 Et cum sentiens certificaverit quantitatem remotionis rei vise et
 210 quantitatem anguli quem continet piramis continens rem vi-
 sam, certificabit quantitatem illius rei vise.

[3.165] Motus autem axis super partes rei vise non erit per
 girationem axis a loco centri et per motum eius per se super
 partes rei vise, quoniam iam declaratum est quod ista linea
 215 semper est extensa recte usque ad locum girationis nervi super
 quem componitur oculus. Et cum situs eius a visu non muta-
 tur, sed totus oculus movetur in oppositione rei vise, et medi-
 um loci, qui est locus sensus visus, opponitur cuilibet parti
 partium rei vise, et cum totus visus movebitur in oppositione
 220 rei vise, axis transibit per quamlibet partium rei vise. Et tunc
 forma cuiuslibet partium rei vise extenditur ad visum apud
 perventum axis ad ipsam super rectitudinem axis. Et cum hoc
 erit axis fixus in suo situ, et non mutabitur a suo loco respectu
 omnium partium totius oculi. Et erit giratio eius in ista dispo-
 225 sitione apud motum totius visus in loco nervi qui est apud
 concavum ossis tantum.

198 mediocribus: mediocris P1 200 post est add. in R/post huiusmodi add.
 mediocrium ES (inter. a. m. S); add. mediocrium P3/visibilium: visibilibus R 201 ip-
 sum: ipse C1P1S 202 partium . . . quantitates (203) om. P3 203 quantitates:
 quantitatem R 205 post cum add. sentiens R/eius om. E 206 post motum add.
 axis C1L3S (inter. L3; inter. a. m. S) 207 respicientis corr. ex respiciens S 210 pira-
 mis corr. ex pyramidis P3 212 post erit scr. et del. nisi L3 213 axis om. P1; inter.
 a. m. S/post centri add. visus C1ErL3S (inter. L3; inter. a. m. ErS) 215 semper est
 transp. L3 216 cum: tamen C1ErL3S; quod R 217 sed: et P1R 218 cuilibet
 corr. ex cuiuslibet Er 219 post vise scr. et del. et tunc forma cuiuslibet partium rei vise
 extenditur ad visum apud perventum axis ad ipsam S/et: ergo R 220 axis . . . vise
 mg. L3/post quamlibet add. partem C1ErL3P1 221 extenditur: extendetur R/post
 apud scr. et del. c Er 222 ipsam: ipsum L3/post ipsam inter. rem a. m. Er/super:
 secundum L3/cum hoc om. R 223 post axis add. pyramidis P1/situ: loco EP3R
 224 post partium add. eius EL3P3/totius corr. ex totium S/post oculi scr. et del. et erit
 giratio eius in ista dispositione apud motum totius oculi L3/ista: sua P3 225 qui
 corr. ex quidem S 226 ossis: axis P3

[3.166] Et cum visus voluerit intueri rem visam et inceperit
intueri in extremitatem rei vise, erit tunc extremum axis super
partem extremam rei vise. Erit ergo in ista dispositione maior
230 pars totius rei vise in parte superficiei visus declinante aut
obliqua ab axe ad aliquam partem preter partem super quam
est axis, quoniam forma extremitatis eius erit in medio eius et
in loco axis in visu, et erit residuum forme obliquum ad aliam
partem ab axe. Deinde, quando visus movebitur post istam
235 dispositionem super aliam dyametrum rei vise, transferetur
axis ad partem sequentem illam partem illius, et erit forma
prime partis declinans ad alterum ubi oppositum ubitati ad
quam movetur axis. Iam deinde non cessabit forma declinare
dum axis movetur super illum dyametrum quousque axis per-
240 veniat ad ultimum illius dyametri rei vise et ad partem extre-
mam rei vise oppositam prime partis. Erit ergo forma totius
rei vise in ista dispositione obliqua ad ubi oppositum ubitati
ad quam prius fuit obliqua preter quam ultima pars extrema
que erat super axem et in medio visus. Et axis in toto isto
245 motu erit fixus in suo situ, et erit iste motus valde velox, et in
maiori parte est insensibilis propter velocitatem. Axis autem
non superponitur in suo motu terminis anguli quem respicit res
visa apud centrum visus, nec secatur latitudinem anguli quem
respicit aliquis dyametrorum rei vise, quoniam hoc non erit
250 nisi quando axis fuerit motus per se et totus oculus quiescens,
quod est impossibile. Sed totus oculus movetur apud intuitio-
nem, et axis movetur per motum eius. Sentiens autem non
comprehendit quantitatem anguli quem respicit res visa apud
centrum visus nisi ex comprehensione quantitatis partis super-
255 ficiei visus in qua figuratur forma rei vise et ex ymaginatione

227 *post cum scr. et del. to P3/voluerit corr. ex volueri P3/inceperit: ceperit Er; incept*
L3P1/inceperit intueri (228) transp. P3 228 *in om. ErL3* 230 *declinante:*
declinate S 232 *extremitatis om. C1EErL3P3R/erit inter. L3* 233 *post obliquum*
add. aut EEerL3P1P3R (scr. et del. L3)/ante ad add. declinans R/aliam: aliquam ErL3
234 *ante post scr. et del. istis quomodo P1/istam: illam EL3P3R* 235 *aliam: aliquam*
ErL3/transferetur: transferentur Er 236 *post partem¹ scr. et del. visam P1/illius om.*
R/erit om. R 237 *post partis add. illius L3/declinans: declinabit R/ad¹: super P3R;*
corr. ex super a. m. E/ubi: ubitatem R; corr. ex visi L3/ubitati corr. ex veritati S
239 *illum: illam EP3R/axis² om. P3* 240 *et om. ErP1/post partem scr. et del. ex-*
trem C1 241 *rei corr. ex rem L3/post vise scr. et del. n L3/partis: parti EEerP1P3R*
242 *ubi: ubitatem R/oppositum: oppositionem E; oppositam R* 243 *quam²: quod*
C1P1S/extrema om. R 244 *visus om. P1/toto isto corr. ex isto toto S* 245 *post*
suo scr. et del. in E 247 *superponitur: supponitur EEerP1P3RS/terminis: terminus*
C1L3P1R/post respicit add. illa EP3R/res... respicit (249) om. P1 249 *aliquis: aliqua*
R/erit mg. a. m. C1 250 *fuerit: fuit P3/quiescens: quieverit R* 251 *sed om. R/*
post totus add. enim R 252 *movetur rep. P1* 255 *figuratur corr. ex fangantur P3*

anguli quem respicit illa pars apud centrum visus.

[3.167] Et sensus visus comprehendit naturaliter quantitates partium visus in quibus figurantur forme, et naturaliter ymaginatur angulos quos respiciunt iste partes. Sentiens
 260 autem non certificat formam rei vise et quantitatem magnitudinis rei vise per motum visus nisi quia per istum motum comprehendit quamlibet partem partium rei vise per eius medium et per locum axis in visu. Et per istum motum movetur forma rei vise super superficiem visus, et sic mutabitur
 265 pars superficiei visus in qua fuit forma, quoniam forma rei vise apud motum erit in parte post aliam et partem post aliam in superficie visus. Et quotiens comprehenderit sentiens partem rei vise que est apud extremum axis, comprehendet cum hoc totam rem visam, et comprehendet totam partem superficiei
 270 visus in qua pervenit forma totius rei vise, et comprehendet quantitatem illius partis, et comprehendet quantitatem anguli quem respicit illa pars apud centrum visus. Et sic multotiens comprehendet sentiens quantitatem anguli quem respicit illa res visa; quare erit ab eo certificata, et quare etiam virtus distinctiva intelliget quantitatem anguli et quantitatem remotionis,
 275 et ex eis comprehendet quantitatem magnitudinis rei vise secundum veritatem. Secundum ergo hunc modum erit intuitio visibilium a visu et certificatio quantitatis magnitudinum rerum visarum per intuitionem.

280 [3.168] Et etiam quando visus comprehendit quantitates longitudinum linearum radialium que sunt inter visum et terminos rei vise aut partes superficiei rei vise, sentiet equalitatem et inequalitatem earum quantitatum. Si autem superficies rei vise quam visus comprehendit fuerit obliqua, sentiet obli-

257 et: nam R/visus om. P1; inter. a. m. S 259 ymaginatur corr. ex ymaginantur C1L3
 261 motum¹ corr. ex motus L3 262 partem om. EP3R/vise corr. ex visus P1/post vise
 scr. et del. et L3 263 per¹ inter. a. m. C1/motum mg. a. m. C1 264 forma corr. ex
 formam S/post superficiem scr. et del. rei vise C1/superficiem visus inter. L3/mutabitur:
 mutatur EP3 265 qua corr. ex quam L3 266 post motum add. non ErL3 (scr. et
 del. L3)/et om. R/et partem transp. P1/et . . . aliam mg. P3/post aliam² om. R
 267 visus om. C1P1S 268 extremum: extremitatem L3/cum hoc: simul R
 269 rem visam corr. ex visam rem P3 270 qua: quam EErl3P3R/comprehendet:
 comprehendit C1EP1P3S 271 ante illius scr. et del. totius C1/illius partis transp. C1/
 comprehendet: comprehendit P3; alter. in comprehendit E 272 pars om. P3
 273 comprehendet: comprehendit Er 274 visa corr. ex via P3/et om. R/quare om.
 C1S/quare etiam transp. P1 276 et om. R/eis: quibus R 277 post erit add. intentio
 vel EP3/intuitio corr. ex intentio L3; alter. in intentio a. m. S/post intuitio scr. et del. vel
 intentio C1 279 intuitionem: intentionem EP3 280 comprehendit: comprehendet
 C1EP3R/quantitates: quantitatem Er 283 earum: eorum Er/autem om. R
 284 comprehendit: comprehenderit C1P1/fuerit: fuit P1/obliqua sentiet mg. a. m. S/
 sentiet corr. ex sentiens L3

285 quationem eius ex sensu inequalitatis quantitatum remotionum
extremorum eius. Et si superficies fuerit directe opposita, sen-
tiet directionem ex sensu equalitatis remotionum. Et sic non
latet quantitas magnitudinis eius virtutem distinctivam, quo-
niam virtus distinctiva comprehendit ex inequalitate remotio-
290 num extremorum dyametrorum spatii obliqui obliquationem
pyramidis continentis ipsum quarum sentiet excessum mag-
nitudinis basis eius propter obliquationem. Et non admiscetur
secundum assimilationem quantitas magnitudinis oblique mag-
nitudini directe opposite nisi quando comparatio fuerit ad
295 angulum tantum. Si autem comparatio fuerit ad angulum et ad
longitudines linearum radialium interiacentium visum et extre-
ma rei vise, non dubitabit in quantitate magnitudinis.

[3.169] Quantitates autem magnitudinis linearum et spati-
orum comprehenduntur a visu ex comprehensione quantitatum
300 remotionum extremorum earum et ex comprehensione inequali-
tatis et equalitatis earum. Sed remotior et remotissima remo-
tionum mediocrium respectu rei vise quando res visa fuerit
obliqua est minor remotissima remotionum mediocrium respec-
tu illius eiusdem rei vise quando fuerit directe opposita. Quo-
5 niam remotio mediocris rei vise est in qua non latet visum pars
rei vise habens proportionem sensibilem ad totam rem visam.
Et cum res visa fuerit obliqua, angulus quem continent duo
radii exeuntes a visu ad aliquam partem rei vise oblique erit
minor angulo quem continent radii duo exeuntes a visu ad
10 illam eandem partem et ad illam eandem remotionem quando
res visa fuerit directe opposita visui. Et pars habens sensibi-
lem proportionem ad totam rem visam quando res visa fuerit
obliqua latet in remotione minori remotione in qua latet eadem

285 quantitatum remotionum *transp. S* 287 *ante ex add. eius Er* 288 latet: latebit
R/*ante eius scr. et del. rei vise P1* 289 inequalitate *corr. ex equalitate P3* 290 ex-
tremorum dyametrorum *transp. EEerL3P3R* 291 *post ipsum inter. spatium a. m. Er/*
quarum: quare EEerP3R; quia P1 292 basis eius *transp. EP3R* 293 *post quantitas*
scr. et del. m Er/oblique: obliqua P3 296 radialium *mg. P1/ante visum add. inter R*
297 rei *corr. ex res Er/ante in add. virtus distinctiva R/quantitate: quantitatem P3*
298 quantitates *corr. ex quantitas Er/autem magnitudinis: ergo magnitudinum*
EEerL3P3R/magnitudinis linearum transp. L3 300 earum: in illis R/*ex om. C1/*
inequalitatis et equalitatis (1): equalitatis et inequalitatis L3 1 earum: eorum
L3P3R/remotior et: remotio R 2 mediocrium: mediocrum *L3P3/quando corr. ex*
quoniam L3 3 mediocrum: mediocrum *P3* 4 rei *corr. ex res Er/post quando*
add. res visa EP1P3R 5 *ante rei add. respectu EEerL3P3R/est om. P3; inter. a. m. E/est*
... vise (6) rep. P1 6 sensibilem: sensibiliu EP3/*visam om. P1* 7 obliqua:
aliqua C1Er/continent: continet C1/post continent scr. et del. anguli P3/post duo scr. et
del. anguli P3 8 partem rei vise: rei vise partem *L3/erit: est S* 9 quem: que *P1/*
radii duo transp. R/a visu om. C1 10 illam': aliam *Er/eandem partem transp. C1/*
post partem add. a visu C1 13 remotione²: quam est remotio R

illa pars quando illa res visa fuerit directe opposita. Remotis-
 15 sima ergo remotionum mediocrium respectu rei vise obliqua est
 minor remotissima remotionum mediocrium respectu illius
 eiusdem rei vise quando illa res visa fuerit directe opposita.
 Et tota res visa obliqua latet in remotione minori remotione in
 20 qua latet illa res visa quando fuerit directe opposita, et dimi-
 nuitur quantitas eius in remotione minori remotione qua dimi-
 nuitur quantitas eius quando fuerit directe opposita.

[3.170] Magnitudines ergo rerum visarum quarum quanti-
 tates certificantur a visu sunt ille quarum remotio est mediocris
 et quarum remotio respicit corpora ordinata continuata, et
 25 comprehenduntur a visu ex comparatione illarum ad angulos
 pyramidum radialium continentium ipsa et ad longitudines
 linearum radialium. Remotiones autem mediocres respectu
 alicuius rei sunt secundum situm illius rei vise in obliuatione
 aut in directa oppositione. Et anguli non certificantur nisi per
 30 motum visus respicientis super dyametros superficiei rei vise
 aut super spatium cuius magnitudinem voluerit scire, et cer-
 tificatur remotio per motum visus super corpus respiciens
 remotiones extremorum illius superficiei aut illius spatii. Et
 generaliter forma remotionis et forma rei vise cuius remotio est
 35 mediocris (et cum hoc est respiciens corpora ordinata continu-
 ata) perveniunt communiter in ymaginatione simul apud intui-
 tionem rei vise quando visus comprehendit corpus respiciens
 remotionem rei vise apud comprehensionem rei vise. Et sic
 virtus distinctiva comprehendet magnitudinem rei vise secun-
 40 dum quantitatem forme remotionis eius certificate coniuncte
 cum forma eius. Quantitates ergo huiusmodi visibilium tantum
 comprehenduntur a visu vera comprehensione. Secundum ergo
 hunc modum quem declaravimus comprehenduntur magnitudi-
 nes rerum visarum per sensum visus.

14 pars corr. ex partes P3/illa res transp. L3/remotissima (15): remotissa E
 15 mediocrium: mediocrum P3/obliqua: oblique EL3P3 17 directe: recta EP3; recte
 C1ErL3S/directe opposita transp. C1 18 post visa scr. et del. recta latet S/remotione²:
 quam est remotio R/in² inter. L3 20 ante qua add. in EErL3P1P3R 21 post
 quando add. si C1/fuerit: sit C1 25 comprehenduntur: comprehenditur ErL3
 26 ipsa: ipsas R/longitudines: longitudinem C1S 28 alicuius om. R/alicius rei
 transp. EP3/post rei¹ add. vise EErL3P3R/secundum mg. EP3 (a. m. E) 29 aut inter.
 a. m. E/in om. P3 30 respicientis: respicientes E; respiciens Er 31 voluerit: voluit
 EErL3P3 32 post motum scr. et del. ipsius C1 34 post forma¹ add. rei vise cum
 forma EErL3P3; add. et forma R/et forma om. EErL3P3R 35 cum . . . respiciens:
 respicit R 36 perveniunt: pervenerint P1/ymaginatione: imaginationem R
 37 quando: quoniam P1R/comprehendit: comprehendet S 38 comprehensionem:
 comprehensione Er 40 post forme scr. et del. rei vise E/eius inter. L3 41 tantum
 inter. a. m. E

- 45 [3.171] Quare vero res visa comprehenditur in maxima
remotione minoris quantitatis sue vere, et quare comprehendi-
tur quantitas rei vise in propinquissima remotione maior quan-
titate sua vera nos declarabimus illud, et dicemus causas eius
apud nostrum sermonem in erroribus visus.
- 50 [3.172] Distinctio vero que est inter visibilia comprehendi-
tur a visu ex distinctione formarum duorum corporum sive duo-
rum visibilium distinctorum pervenientium in visu. Sed in
distinctione que est inter quelibet duo corpora distincta, aut
erit lux aut corpus coloratum illuminatum, aut erit obscuritas.
- 55 Cum ergo visus comprehendit duo corpora distincta, forma
lucis, aut forma coloris corporis, aut forma obscuritatis que est
in loco distinctionis pervenit in partem visus interiacentem
duas formas duorum corporum distinctorum pervenientium
in visum. Lux autem, aut color, aut obscuritas fortassis erit in
- 60 corpore medio interiacente duo corpora continuata cum utro-
que corporum. Si ergo visus non senserit quod lux aut obscuri-
tas que est in loco distinctionis non est in corpore continuato
cum utroque corporum que sunt in eius lateribus, non sentiet
distinctionem duorum corporum. Et etiam superficies cuiusli-
- 65 bet illorum duorum corporum est obliqua ad locum remotionis
in loco distinctionis. Igitur forte erit obliquatio duarum super-
ficierum duorum corporum aut superficiei alterius duorum
corporum manifesta visui, et forte non. Cum ergo obliquatio
duarum superficierum duorum corporum aut superficiei alteri-
- 70 us duorum corporum fuerit manifesta visui, tunc sentiet visus
distinctionem duorum corporum. Visus ergo comprehendit
distinctionem corporum ex comprehensione utriusque intentio-
num quas diximus: aut ex comprehensione lucis in loco dis-

45 *visa corr. ex vera S/comprehenditur: comprehendatur R* 46 *sue vere: sua vera*
quantitate R/vere corr. ex lineae L3/comprehenditur (47): comprehendatur R 47 *re-*
motione om. L3/maior: minore Er; corr. ex maiore L3 48 *nos om. R/declarabimus:*
declaravimus C1S/illud: istud EL3P3/illud . . . eius om. R 49 *apud . . . in: in nostro*
sermone de R 51 *a corr. ex ex L3/sive om. EErL3P3* 52 *visu: visum EErL3P3R*
53 *inter om. P1S; mg. a. m. C1/quelibet om. S; mg. a. m. C1/quelibet . . . corpora: corpora*
quelibet P1/distincta corr. ex distinctiva L3/aut erit lux (54) om. P3 54 *erit¹: est*
EL3R/post aut¹ add. est EP3R/erit²: est R/obscuritas corr. ex curvitas P3 55 *visus*
om. P1/comprehendit: comprehenderit EErL3P3R; comprehendet S 57 *post pervenit*
scr. et del. in pervenit P3 58 *ante duas add. inter R* 59 *lux autem: et lux EErL3P3/*
autem: vero R/fortassis: forte P1; aliquando R/erit inter. a. m. E 60 *ante duo add.*
inter R/continuata: continuato C1EErL3 61 *post lux add. color R* 64 *etiam alter.*
in cum C1; corr. ex cum a. m. S/superficies: superficiei EP3 65 *obliqua corr. ex*
oblique L3; alter. in obliquatio P3/locum corr. ex loco P3 66 *post loco scr. et del. dis*
C1/distinctionis igitur transp. EL3P3R/igitur: ergo R/superficierum (67): forma-
rum P3 67 *post superficiei add. unius EErL3P3* 68 *post corporum scr. et del. aut*
superficiei S 72 *utriusque om. R* 73 *post lucis scr. et del. et coloris L3*

75 tinctionis, sentiendo quod illa lux est ex posteriori duarum
superficierum duorum corporum distinctorum; aut ex compre-
hensione corporis colorati in loco distinctionis, sentiendo quod
illud est diversum ab utroque corporum distinctorum; aut ex
comprehensione obscurationis loci distinctionis, comprehen-
dendo quod illud est obscuritas et non corpus continuatum
80 cum duobus corporibus; et ex comprehensione obliquationis
utriusque superficierum duorum corporum in loco distinctionis
aut obliquationis superficiei alterius duorum corporum. Omne
ergo quod visus comprehendit ex distinctione corporum non
comprehenditur nisi secundum aliquam istarum intentionum.

85 [3.173] Distinctio autem forte erit inter duo corpora dis-
tincta, et forte erit inter duo corpora non diversa—scilicet quod
duo corpora sunt continuata secundum quasdam partes et
diversa secundum quasdam inter se, ut digiti et membra ani-
malis, et rami arborum. Et secundum utramlibet dispositio-
90 num visus non comprehendit distinctionem nisi secundum
modos quos declaravimus. Et forte contingit distinctio cor-
porum per cognitionem et per scientiam antecedentem, sed illa
comprehensio non est per sensum visus.

[3.174] Et quedam distinctio corporum est ampla, et que-
95 dam stricta. Distinctio vero ampla non latet visum in maiori
parte propter apparentiam corporis respicientis distantiam
distinctam, et propter hoc quod illud corpus apparet diversum
ab utroque corporum distinctorum, et propter comprehensio-
nem lucis et vacuitatis illuminati respicientis distantiam. Dis-
100 tantia autem modica et stricta non comprehenditur a visu nisi
in remotione in qua non latet visum corpus cuius quantitas est
equalis quantitati amplitudinis distantie. Si autem distantia
inter duo corpora fuerit stricta occulta, et fuerit remotio illius a
visu similis illi in qua lateant corpora quorum quantitas est

74 lux *om.* P3/est *om.* ErS; *mg.* L3 75 duorum *om.* P1 77 post illud *add.* corpus
EErL3P3R/distinctorum *corr.* ex distinctiorum S 78 obscurationis *corr.* ex obscuritatis
EP3 (*a. m.* E) 79 illud: istud L3R/post non *add.* est EEerL3P3R/post corpus *scr. et del.*
illuminatum P1 80 duobus *om.* Er/et: aut R 83 ergo: igitur P1 84 com-
prehenditur: comprehendit R/aliquam: aliam C1S 85 distincta (86) ... corpora (86)
mg. L3 86 erit *om.* E 87 continuata *corr.* ex continui S 89 rami: ram P1/
utramlibet *corr.* ex utram Er 90 post secundum *add.* suos P1 91 contingit:
comprehenditur EP3; comprehenditur ErL3R 92 et ... antecedentem: antecedentem
et per scientiam EP3 93 sensum *corr.* ex sensus P3 96 respicientis: aspicientis
EL3P3; *corr.* ex aspicientis S 99 vacuitatis: vacuitatem EP3; *corr.* ex vacuitas P1/post
vacuitatis *add.* aeris EP3/illuminati: illuminate L3/distantiam: distinctam P3/distantia
(100): distinctio R 100 modica *corr.* ex mediata *a. m.* C1 102 amplitudinis:
amplitudini ErL3 103 post stricta *add.* et EP3R 104 est ... quantitas (105)
om. P1

105 sicut quantitas amplitudinis distantie, non comprehendet
visus illam distantiam, etsi remotio duorum corporum a visu
sit ex remotionibus mediocribus, et visus comprehenderit duo
corpora vera comprehensione. Quoniam mediocris remotio est
110 illa in qua non latet omnino quantitas sensibilis respectu quan-
titatis totius remotionis, et vera comprehensio est illa inter
quam et veritatem rei vise non est diversitas sensibilis omnino
respectu totius rei vise. Amplitudo autem distantie forte erit
115 talis quantitatis carentis proportionem sensibili ad remotionem
rei vise et carentis quantitate sensibili respectu utriusque duo-
rum corporum distinctorum, quoniam distinctio forte erit
quantitatis unius capilli; et tamen istud diminutum non aufert
distantiam. Distantia igitur inter visibilia similiter
comprehenditur a visu secundum modos quos declaravimus.

[3.175] Continuatio autem comprehenditur a visu ex pri-
120 vatione distantie. Cum ergo visus non senserit in corpore ali-
quam distantiam, comprehendet ipsum esse continuum, et si in
corpore fuerit distantia occulta non comprehensa a visu, com-
prehendet visus illud corpus esse continuum, quamvis in eo sit
discretio.

125 [3.176] Et visus comprehendit continuationem et etiam
discernit inter continuationem et contiguationem ex compre-
hensione aggregationis duorum terminorum duorum corporum.
Et visus non iudicat contiguationem nisi postquam sciverit
quod utrumque duorum corporum contiguum est diversum
130 ab altero, quoniam differentia que est inter duo contigua forte
invenitur in duobus corporibus continuis. Si ergo sentiens non
senserit quod utrumque duorum corporum contiguum est
diversum ab altero et distinctum ab eo, non sentiet contigu-
ationem et iudicat continuationem.

107 sit: fuerit EP3 108 quoniam: autem R/quoniam mediocris transp. R/post
quoniam add. remotio EP3/remotio: rei P3; inter. a. m. E 112 erit: sit R 114 utri-
usque om. R 115 forte: forme EP3/post erit add. in R 116 quantitatis: quantitate
P3R/et om. EL3P3R/tamen: tum R/istud: illud R 117 post distantiam add. sensibilem
in visu R/distantia: distinctio P3 (mg.)/igitur: ergo L3/similiter om. EEerL3P3R
119 comprehenditur: similiter P1S; corr. ex similiter C1/post visu add. est P1S
120 ergo: igitur P1/corpore aliquam (121): aliquo corpore R 121 post distantiam
scr. et del. non E 123 illud corpus transp. EP3 125 et visus transp. Er; corr. ex visus
et L3/comprehendit: comprehendet C1; comprehenderit L3/post comprehendit add.
etiam EP3/et etiam transp. ErL3/etiam om. EP3R 126 et contiguationem om. P1
127 ante aggregationis scr. et del. g a L3/aggregationis corr. ex girationis a. m. L3/ter-
minorum: nervorum S; corr. ex corporum P3 128 post non scr. et del. conti P1/
contiguationem: continuationem P1 129 quod: ad Er (scr. et del.)/utrumque:
unumquodque P1 132 utrumque: unumquodque P1 134 iudicat: iudicabit
C1EErP1P3R/continuationem corr. ex continui P3

135 [3.177] Numerus comprehenditur a visu et numeri medi-
 etas, quoniam visus comprehendit in una hora multa visibilia
 distincta in simul, et cum visus comprehenderit distinctionem
 illorum, comprehendet quod quodlibet illorum est diversum ab
 alio, et sic comprehendet multitudinem. Et virtus distinctiva
 140 comprehendet numerum ex multitudine. Numerus ergo com-
 prehendetur per sensum visus ex comprehensione multorum
 visibilium distinctorum quando visus comprehenderit ipsa in
 simul, et comprehenderit distinctionem illorum, et comprehen-
 derit quod quodlibet illorum est diversum ab alio. Secundum
 145 ergo istum modum comprehenditur numerus per sensum visus.

[3.178] Motus autem comprehenditur a visu ex compara-
 tione rei mote ad aliud visibile, quoniam visus, quando com-
 prehenderit visibile motum et cum ipso comprehenderit aliud
 visibile, comprehendet situm eius respectu illius visibilis moti.
 150 Et cum visibile fuerit motum et illud aliud visibile fuerit non
 motum, per motum visibilis illius moti situs visibilis illius moti
 diversabitur respectu illius visibilis non moti apud motum. Et
 cum visus comprehenderit ipsum, et comprehenderit cum eo
 aliud visibile, et comprehendit situm eius respectu illius visibi-
 155 lis, comprehendet motum eius. Motus ergo comprehenditur a
 visu ex comprehensione diversitatis situs rei vise mote respec-
 tu alterius.

[3.179] Et motus comprehenditur a visu secundum aliquem
 trium modorum: aut ex respectu rei vise mote ad multa visi-
 160 bilia, aut ex respectu rei vise mote ad unum visibile, aut ex
 respectu rei vise ad ipsum visum. Primum autem quando
 visus comprehenderit rem visam et motum, et comprehenderit

135 *post numerus add. autem EErL3P3; add. vero P1R/medietas* (136) *corr. ex meidie-*
tas S 136 *hora corr. ex linea E* 137 *distincta in om. R* 138 *quod om. EP3R/*
quodlibet corr. ex quemlibet C1/est: esse EP3R/diversum: divisum Er 139 *alio corr.*
ex altero E/comprehendet: comprehendit EL3P3R 140 *comprehendet: comprehendit*
EP3R/comprehendetur (141): *comprehenditur EL3P3* 142 *quando corr. ex quoniam*
S/comprehenderit: comprehendit R/in om. R 143 *illorum ... quodlibet* (144) *mg.*
EP3 (a. m. E); om. P1 144 *diversum: divisum C1ErP1* 147 *visibile corr. ex*
visibilium P1/post visibile scr. et del. comprehendet situm eius respectu illius visibilis
Er/visus quando transp. R/comprehenderit (148): *comprehenderat Er* 148 *visibile*
corr. ex visibilem EL3 149 *situm corr. ex sutum P3* 150 *post cum add. illud*
EP1P3R/post visibile² scr. et del. non P1/post non scr. et del. per P1 151 *visibilis*
illius¹ transp. EL3P3R/visibilis illius² transp. EP3R 152 *apud motum om. R*
 153 *post et add. cum C1S/comprehenderit: comprehendit P1/comprehenderit cum eo:*
cum eo comprehendit EP3R 154 *et om. EP3; inter. L3/comprehendit:*
comprehenderit ErL3; comprehendet R/illius om. P1 155 *ante comprehendet add.*
et EP3R (inter. a. m. E) 156 *mote: moti L3* 159 *ante aut scr. et del. predictorum*
C1/ex om. C1P1/post mote add. quidem L3 160 *aut¹ ... visibile mg. P3/ex¹ om. C1S/*
mote om. P3 161 *post vise add. mote C1P1R* 162 *post visam scr. et del. ad S/ante*
motum add. eius R/et² inter. L3

ipsam respicientem aliquod visibile, deinde comprehenderit
 ipsam respicientem aliquod visibile diversum a primo, existen-
 165 te visu in suo loco, sentiet motum illius rei vise. Respectus
 autem rei vise mote ad unum solum visibile est quando visus
 comprehenderit rem visam motam, et comprehenderit situm
 eius respectu alterius visibilis, deinde comprehenderit situm
 eius qui mutatus est respectu illius alterius eiusdem visibilis,
 170 aut quod est remotius, aut quod est propinquius, aut quod est
 in parte altera, existente visu in loco suo, aut per mutationem
 situs alicuius partis rei vise mote respectu illius visibilis immo-
 ti, aut per mutationem situs partium eius respectu illius visibi-
 lis. Et secundum istum ultimum modum comprehendit visus
 175 motum visibilis moti circulariter quando homo comparaverit
 ipsum ad aliud visibile. Cum ergo visus comprehenderit situm
 rei mote vise, aut situm partium eius, aut situm alicuius partis
 eius, comprehendet motum rei vise mote.

[3.180] Respectus autem rei vise mote ad ipsum visum est
 180 quando visus comprehenderit rem visam motam, comprehen-
 det ubitatem eius et remotionem eius. Et cum visus fuerit qui-
 etus, et res visa fuerit mota, et tunc mutabitur situs rei vise
 mote respectu visus. Si ergo motus rei vise fuerit secundum
 spatium latum, mutabitur ubitas eius, et sentiet visus mutati-
 185 onem ubitatis eius, et cum visus senserit mutationem ubitatis
 eius, visu quiescente, sentiet motum eius. Et si motus rei vise
 fuerit in longitudine extensa inter ipsam et visum, aut res visa
 tunc elongabitur a visu per motum aut appropinquabitur. Et
 cum visus senserit elongationem aut appropinquationem eius,
 190 visu existente in suo loco, sentiet motum eius. Et si motus rei
 vise fuerit circularis, necessario mutabitur pars eius que oppo-
 nitur visui, et cum illa pars rei vise fuerit mutata, et sentiet

164 ipsam: ipsum *E*/aliquod: aliud *EP3/post* aliquod *add.* aliud *P1R* 165 sentiet
corr. ex sentiei *P3* 166 mote *corr. ex* motum *C1*; *corr. ex* moti *P3* 167 motam
... eius (168) *om. P3* 168 *post* respectu *add.* unius *P1*/alterius *corr. ex* unius *a. m. ES*/
visibilis *corr. ex* visibile *P1* 169 eiusdem *om. R* 170 est¹ *om. P3* 171 existente
visu *transp. EP3R*/loco suo *transp. EL3P3R* 172 mote: motu *P1* 173 illius
visibilis (174) *transp. EP3R* 174 istum ultimum *transp. C1ErS* 176 ergo: igitur
E 177 rei mote vise: vise rei mote *E*/mote vise *transp. L3P3R* 179 visum
rep. P1 180 comprehendit: comprehendit *EP3R* 181 *post* eius² *add. a*
visu *EP1P3R* 182 et² *om. R*/tunc *om. C1ErS*; *inter. L3* 185 eius *om. R*
187 ipsam: ipsum *EL3R*/aut *om. R*/post aut *add. tunc EP3R* 188 tunc *om. C1EErL3P3*/
appropinquabitur: appropinquabit *R/ante* et *add. per* motum *P1* 189 appropin-
quationem *corr. ex* propinquationem *S* 190 visu existente *corr. ex* visus existenti
P3/existente corr. ex extente *S/post* loco *add. visus EP3R*/rei vise fuerit (191) fuerit rei
vise *EL3P3* 191 pars: situs *Er*; *corr. ex* situs *C1L3 (a. m. C1)*/post pars *add. rei vise ER*;
add. rei P3/post eius *add. vise P3* 192 cum *om. EP3*/sentiet: senserit *R*

visus mutationem eius, visu existente in suo loco, sentiet motum rei vise. Secundum ergo istos modos comprehendet visus
 195 motum quando visus fuerit fixus in suo loco.

[3.181] Et visus etiam comprehendet motum secundum quemlibet istorum modorum, quamvis visus etiam moveatur. Et hoc erit quando visus senserit diversitatem situs rei vise mote, sentiendo quod illa diversitas non est propter motum
 200 visus et distinguendo inter diversitatem situs que accidit illi rei vise propter motum ipsius rei vise et inter diversitatem situs que accidit ei propter motum visus. Cum ergo visus senserit diversitatem situs rei vise et senserit quod diversitas situs eius non est propter motum visus, sentiet motum rei vise. Et forma
 205 rei vise mote movetur etiam in visu propter motum eius. Sed visus non comprehendit motum rei vise ex motu sue forme in visu tantum; immo visus non comprehendit motum rei vise nisi ex comparatione rei vise ad aliam secundum modos quos declaravimus. Quoniam forma rei vise quiescentis aliquando
 210 movetur in visu in quiete illius rei vise, et inde visus non comprehendit ipsam motam, quoniam visus, quando movebitur secundum oppositionem rerum visarum, movebitur forma cuiuslibet rei vise opposite visui in superficie visus apud motum eius, sive sit quiescens sive sit motum. Et quia visus iam
 215 assuetus est ad motum formarum rerum visarum in superficie eius cum quiete illarum rerum visarum, non iudicabit motum rei vise propter motum forme eius nisi quando in visu pervenerit forma alterius rei vise, et comprehenderit visus diversitatem situs forme rei vise mote respectu alterius forme rei vise aut ex
 220 mutatione formarum in eodem loco visus, que erit in loco circulari. Motus ergo non comprehenditur a visu nisi secundum modos quos distinximus.

[3.182] Comprehensio autem qualitatis motus est ex com-

193 suo loco *transp.* E 194 comprehendet: comprehendit EP3R 195 suo loco *transp.* S 196 etiam comprehendet *transp.* EErL3P3R 198 rei vise *transp.* EP3
 200 visus: eius EErP3R; *corr.* ex eius L3/que: qui EP3/illi . . . accidit (202) *om.* L3/post illi *scr.* et *del.* ro P1 201 vise¹ *om.* R/ipsius: illius EP3 202 post accidit *scr.* et *del.* illi rei vise S/ergo: igitur P1 203 et . . . vise (204) *om.* EErL3P3/situs eius *transp.* R
 205 propter: per EP3 207 comprehendit: comprehendint P1 208 secundum: sed Er 210 in²: cum EErL3P3R; *alter.* in cum a. m. C1/illius *om.* EP3/post vise *add.* quidem L3/inde *corr.* ex tamen L3 211 movebitur *corr.* ex moverit P1 214 sit quiescens: quiescat R/sit² *om.* C1/sit motum: moveatur R 215 assuetus: assuefactus R 216 iudicabit *corr.* ex iudicad P3; *corr.* ex iudicabis S 217 visu: visum R 218 alterius: alicuius R/et . . . mutatione (220) *mg.* L3/post visus *scr.* et *del.* visus S/post diversitatem *add.* eius L3 220 post mutatione *scr.* et *del.* forme ex necessitate L3/post loco¹ *scr.* et *del.* minus P1 223 qualitatis *corr.* ex quantitatis Er/est: visus L3/post ex *scr.* et *del.* parte P1

prehensione spatii super quod movetur res visa quando res
 225 visa movebitur secundum se totum, et visus certificat qualita-
 tem motus quando certificaverit figuram spatii super quod
 movetur res visa mota. Et cum res visa movebitur circulariter,
 visus comprehendet motum eius esse circularem ex compre-
 230 hensione mutationis partium eius sequentium visum apud ali-
 quam rem visam, aut ex respicientia alicuius partis illius ad
 diversa visibilia, unum post alterum, aut ad partes unius rei
 vise, unam partem post aliam, cum quiete totalitatis rei vise in
 suo loco.

[3.183] Et si motus rei vise fuerit compositus ex motu cir-
 235 culari et locali, visus comprehendet illum motum esse com-
 positum ex comprehensione mutationis partium rei vise mote
 respectu visus, aut respectu alterius rei vise, cum comprehen-
 sione motus totalitatis rei vise a suo loco. Secundum ergo istos
 modos visus comprehendit qualitates motus visibilium.

[3.184] Et visus non comprehendit motum nisi in tempore,
 quoniam motus non est nisi in tempore, et omnis pars motus
 non est nisi in tempore. Et visus non comprehendit motum rei
 vise nisi ex comprehensione rei vise in duobus locis diversis
 aut secundum duos situs. Locus autem et situs rei vise non
 245 diversatur nisi in tempore. Cum ergo visus comprehenderit
 rem visam in duobus locis diversis aut in duobus sitibus diver-
 sis, non erit nisi in duabus horis diversis. Sed inter quaslibet
 duas horas diversas est tempus. Visus ergo non comprehendit
 motum nisi in tempore.

[3.185] Et etiam dicemus quod tempus in quo visus com-
 250 prehendit motum non erit nisi sensibile, quoniam visus non
 comprehendit motum nisi ex comprehensione rei vise in duo-
 bus locis diversis, in uno loco post alium, aut secundum duos
 situs diversos, unum situm post alium. Cum ergo visus com-

224 super: secundum P3/post quod scr. et del. n C1 225 visa om. C1/ante se scr. et
 del. situm S/totum: totam EP1P3; alter. in totam a. m. C1 227 movetur corr. ex
 movebitur S 228 post visus scr. et del. non certificat P1/eius om. Er 229 ante
 visum scr. et del. apud aliquam P1; scr. et del. eius sei P3/visum corr. ex visus S/apud:
 ante EEerL3P3; alter. in ante a. m. S 234 compositus: oppositus P1 235 motum
 om. EP3R 236 post comprehensione scr. et del. n C1 237 visus corr. ex motus E
 239 comprehendit: comprehendet C1 240 visus om. C1/nisi . . . motum (242) mg.
 a. m. E/post tempore add. visus C1 241 ante et scr. et del. quoniam motus P1
 243 nisi . . . vise om. P1P3/post vise² add. nisi Er 244 et inter. L3 245 diversatur:
 diversantur EEerP1P3/tempore: temporibus EP3R/ergo: igitur P1 246 aut . . .
 diversis² (247) mg. a. m. E 247 erit: est R/post in add. duobus P3 248 duas om.
 C1/duas horas transp. EL3P3R/duas . . . diversas om. Er/post tempus add. medium
 EP3R/ergo om. P1 254 situm om. P1/comprehendit (255): comprehenderit EP3R

255prehendit rem visam motam in secundo loco et non compre-
henderit ipsam tunc in primo loco in quo comprehendit ipsam
ante, statim sentiet sentiens quod hora in qua comprehendit
ipsam in secundo loco est diversa ab hora in qua comprehen-
dit ipsam in primo loco, quare sentiet diversitatem duarum
260horarum. Et similiter quando comprehenderit motum ex diver-
sitate situs rei mote, quoniam, quando comprehendit rem mo-
tam secundum situm secundum et non comprehenderit ipsam
tunc secundum primum situm secundum quem comprehendit
ipsam ante, statim sentiet diversitatem duarum horarum, qua-
265re sentiet tempus quod est inter ipsas. Tempus ergo in quo
visus comprehendit motum est sensibile necessario.

[3.186] Et cum iste intentiones sunt declarate, narremus
modo quod coacervatur ex eis. Dicemus ergo quod visus com-
prehendit motum ex comprehensione rei vise mote secundum
270duos situs diversos in duabus horis diversis inter quas est
tempus sensibile, et hec est qualitas comprehensionis motus a
visu.

[3.187] Et visus comprehendit diversitatem motuum se-
cundum velocitatem et tarditatem, et equalitatem motuum, ex
275comprehensione spatiorum super que moventur visibilia mota.
Cum ergo visus comprehenderit visibilia duo mota, et compre-
henderit duo spatia super que moventur illa duo visibilia, et
senserit quod alterum duorum spatiorum que a duobus visi-
bilibus motis pertranseuntur in eodem tempore est maius
280altero, sentiet velocitatem rei vise transeuntis super maius
spatium. Et cum duo spatia equalia super que moventur duo
visibilia fuerint pertransita simul aut in duobus temporibus
equalibus, et senserit visus equalitatem eorum spatiorum,

255 rem om. EP3; rep. P1/post in add. suo EP3R/secundo loco transp. EP3R
256 ipsam tunc transp. EP3R/in quo om. P1/comprehendit: comprehenderit C1L3/
ipsam ante (257) transp. EEerL3P3R 257 sentiet sentiens transp. P1/post quod add.
in P1 258 secundo: primo L3/est . . . loco (259) om. L3 259 primo loco
transp. P1 260 quando comprehenderit transp. P1/comprehenderit: compre-
hendit P1 261 mote: visae R/quando: si R/comprehendit: comprehenderit EEerL3P3R
262 secundum²: siderum P1; om. EEerL3P3R 263 quem: quod ErL3 264 quare
(265): quarum ErL3 265 ergo: igitur P1 267 post cum add. omnes C1EEerL3P3R
(mg. a. m. C1)/sunt: sint EP3R/narremus corr. ex narramus a. m. E 268 coacervatur:
coadcervat EP3/ergo: igitur P1 274 equalitatem: qualitatem C1ErL3P1S
275 super corr. ex semper P3/post visibilia scr. et del. a L3 276 visibilia duo transp.
EEerL3P3R/duo mota transp. P1/comprehenderit (277): comprehendit L3 277 duo¹
om. EEerL3P3R/super inter. L3 278 visibilibus (279): visibus Er; corr. ex visibus L3
279 post eodem scr. et del. loco P3/magis: magis P1 280 velocitatem corr. ex
voluntatem P3/post vise add. mote EP1P3R/super: per P1 281 equalia om. EEerL3P3R/
duo om. EP3R 282 fuerint: sunt R; corr. ex sunt EP3 (a. m. E)/simul aut om.
EEerL3P3R/duobus . . . equalibus (283): equalibus . . . duobus P1 283 eorum:
illorum EP3R

sentiet equalitatem motus duarum rerum motarum. Et simili-
 285 ter, si visus senserit equalitatem duorum spatiorum cum ine-
 qualitate duorum temporum duorum motuum, sentiet veloci-
 tatem motus rei mote transeuntis per spatium in minori tem-
 pore; et similiter, quando duo mota transierint in duobus tem-
 poribus equalibus per duo spatia equalia, et senserit visus
 290 equalitatem temporum et equalitatem spatiorum, sentiet
 equalitatem duorum motuum. Iam diximus qualiter visus com-
 prehendit motum et distinguit motum et qualitates eius et
 equalitatem et inequalitatem eius.

[3.188] Quies autem comprehenditur a visu ex comprehen-
 295 sione rei vise in tempore sensibili in eodem loco et in eodem
 situ. Cum ergo visus comprehenderit visum in eodem loco et
 secundum eundem situm in duabus horis diversis inter quas
 est tempus sensibile, comprehendet rem visam in illo tempore
 quiescentem. Et visus comprehendit situm rei vise quiescentis
 300 respectu alterius rei vise et respectu ipsius visus. Secundum
 ergo hunc modum erit comprehensio quietis visibilium a visu.

[3.189] Asperitas vero comprehenditur a visu in maiori
 parte ex forma lucis apparentis in superficie corporis asperi,
 quoniam asperitas est diversitas situs partium superficiei cor-
 5 poris, quare lux, quando orietur super superficiem illius cor-
 poris, partes prominentes facient umbram in maiori parte. Et
 cum lux pervenerit ad partes profundas, erunt cum ea etiam
 umbre, et partes prominentes erunt manifeste luci et disco-
 operte luci. Et cum in partes profundas venerint umbre, et
 10 super prominentes etiam non fuerit aliqua umbra, diversabitur
 forma lucis in superficie illius corporis. In superficie autem
 plana non est ita, quoniam superficiei plane partes sunt con-
 similis situs, et cum lux orietur super ipsas, erit forma lucis in
 tota superficie consimilis. Forma ergo lucis in superficie cor-
 15 poris asperi est diversa a forma lucis in superficie plana. Et

284 motus *om.* *EErL3P3R*/similiter (285) *corr. ex super P3* 285 inequalitate (286)
corr. ex in qualitate P3 288 duo *inter. L3*/transierint *corr. ex transiverint P1*
 290 temporum: temporis *EP3R*/post spatiorum *scr. et del. et L3* 291 iam . . . motum¹
 (292) *om. P3*/qualiter *corr. ex equaliter L3*/comprehendit (292): comprehendat *R*
 292 distinguit: distinguat *R*/qualitates: qualitatem *ER*; *corr. ex equalitatem P3*
 293 equalitatem *corr. ex qualitatem P1* 294 *ex om. EP3* 295 post sensibili *add.*
 et *P1*/et *om. P3*; *inter. L3* 296 ergo: igitur *EL3P3* 297 eundem situm *transp. P1*
 298 est *mg. L3*/est tempus *transp. L3*/tempus *om. P1* 299 comprehendit *corr. ex*
comprehendet Er 300 post alterius *scr. et del. alterius C1* 1 ergo hunc *transp. P3*
 5 orietur: oritur *EL3P3R* 6 facient: faciunt *C1P1S*; faciant *P3* 7 ad: in *EL3P3*/
 erunt *corr. ex eirunt P3*/ea: eo *EErL3P3R*/etiam: et *Er* 8 luci: luce *R* 9 luci: luce
R/venerint: veniunt *EL3P3R* 10 etiam *om. EErL3P1P3R* 12 superficiei *corr. ex*
superficies P1 14 post superficiei¹ *scr. et del. plana S*

visus cognoscit formam lucis que est in superficiebus asperis et formam lucis que est in superficiebus planis propter frequentationem visionis superficierum asperarum et planarum. Cum ergo visus senserit lucem que est in superficiebus corporis
 20 secundum modum quem assuevit in superficiebus asperis, iudicabit asperitatem illius corporis. Et cum senserit lucem in superficie corporis secundum modum quem assuevit in superficiebus planis, iudicabit planitiam in superficiebus illius corporis.

25 [3.190] Et cum asperitas fuerit extranea, erunt partes prominentes alicuius quantitatis, et sic visus comprehendet preminentiam illarum partium, et comprehendet situm superficiei corporis ex comprehensione distantie que est inter partes. Et cum visus comprehenderit diversitatem situum partium superficiei corporis, comprehendet asperitatem eius sine indigentia
 30 ad considerandum lucem.

[3.191] Et etiam quando asperitas corporis fuerit extranea, et oriatur super ipsam lux, erit forma lucis in superficie eius etiam diversa maxima diversitate. Videbitur ergo ex diversitate forme lucis distantia partium et diversitas situs earum, et
 35 ex hoc apparebit asperitas corporis. Si ergo lux oriens super corpus asperum fuerit ex parte opposita superficiei aspere, et fuerit lux fortis, non comprehendet visus asperitatem huius corporis nisi quando comprehenderit prominentiam quarumdam partium et profunditatem quarumdam. Si ergo asperitas
 40 huius corporis fuerit extranea, id est maxima, comprehendet visus distantiam partium et diversitatem situs eorum, et comprehendet asperitatem corporis in maiori parte. Si autem asperitas fuerit modica, et fuerint partes profunde et pori illius
 45 corporis in ultimitate parvitas, latebit visum in maiori parte, et nunquam visus comprehendet asperitatem huius corporis

16 ante asperis scr. et del. planis S 17 formam corr. ex forma a. m. Er 18 ante visionis scr. et del. visus C1/visionis superficierum corr. ex superficierum visionis C1/asperarum corr. ex asperum P3 19 ergo: igitur P1/corporis inter. a. m. E 21 iudicabit: indicabit Er/post lucem mlg. que est a. m. C1 22 post secundum add. hunc L3 25 partes om. Er; inter. L3/prominentes (26): preminentes S; alter. in preminentes a. m. C1 26 visus comprehendet transp. P1/preminentiam (27): prominentiam EErL3P3R 28 corporis: corporum EErL3P3/distantie que est: que est distantie E 30 indigentia corr. ex asperitate Er 31 ante ad add. et P1/considerandum: considerandam P1 32 etiam om. P1 33 ante et add. id est maxima ErP1 (inter. a. m. Er/maxima (??) Er)/oriatur: oritur R/ipsam: ipsum P1/eius etiam (34) om. L3 34 etiam: et P1; om. EErP3R 35 forme om. R/et diversitas corr. ex diversitas et C1 36 apparebit: apparet L3; om. P3/asperitas inter. a. m. Er 37 opposita corr. ex appositorum P1 38 huius: huiusmodi EP3 40 ergo: autem P1 42 eorum: earum EErL3P3R 44 fuerint partes transp. EErL3P3R/partes rep. P1 45 visum om. P3

nisi in magna appropinquatione cum intuitu partium superficiei corporis. Cum ergo visus distinxerit distantiam partium huiusmodi corporis, et prominentiam et profunditatem illorum, 50 comprehendet asperitatem eius. Si autem visus non distinxerit distantiam partium eius, nec prominentiam et profunditatem partium eius, non comprehendet asperitatem eius. Asperitas ergo comprehenditur a visu ex comprehensione diversitatis situum partium superficiei corporis aut ex forma lucis quam 55 visus assuevit in superficiebus corporum asperorum. Et visus etiam cognoscit asperitatem ex privatione consimilitudinis. Cum igitur visus nichil senserit in corpore ex consimilitudine, iudicabit eius asperitatem, sed multotiens errat visus in asperitate quando voluerit cognoscere ipsam per istam intentionem. 60 Quoniam erit superficies tersa, et non apparet eius tersitudo, quoniam tersi non apparent nisi in situ proprio.

[3.192] Planities autem, id est equalitas superficiei corporis, comprehenditur a visu in maiori parte ex forma lucis apparenti in superficie corporis plani quam assuevit videre in 65 superficiebus planis. Et cum lux que est in superficiebus corporis fuerit consimilis forme, cognoscet per ipsam planitiem superficiei. Et visus aliquando comprehendit planitiem per intuitum etiam. Cum ergo visus intuebitur superficiem corporis plani, comprehendet equalitatem partium eius, et sic comprehendet planitiem. 70

[3.193] Tersitudo autem, et est planities fortis, comprehenditur a visu ex scintillatione lucis in superficie sui corporis. Planities ergo comprehenditur a visu ex comprehensione equalitatis superficiei. Equalitas autem superficiei comprehenditur 75 a visu in maiori parte ex consimilitudine forme lucis in super-

48 ergo: igitur P1/partium . . . corporis (49): huiusmodi . . . partium EP3 49 huiusmodi: huius EL3P3/illorum: illarum EErL3R 51 eius om. P1 52 eius¹ om. P3 53 ergo: igitur P1 54 situum partium *corr. ex* partium situum C1/quam . . . assuevit (55): quamvis assuevit P3 55 *post* assuevit *add.* comprehendere C1; *add.* videre R/ante et *scr. et del.* et in P1 56 etiam cognoscit *transp.* R/privatione: praenotione R/consimilitudinis: consuetudinis EErL3P3; *alter. in* consuetudinis a. m. S/*post* consimilitudinis *scr. et del.* vel consuetudinis C1 57 igitur: ergo C1RS/visus om. P1/consimilitudine: consuetudine EErL3P3; *alter. in* consuetudine a. m. S/*post* consimilitudine *scr. et del.* vel consuetudine C1 58 errat: errant S 60 tersa: vera ErL3 61 tersi: tersiones C1P1; tersio L3; tersitudo R; *alter. ex* tersitudo in tersio EP3 (a. m. E)/apparent: apparet EErL3P3R/situ: visu P3 62 id est: et R 63 apparenti (64): apparentis P1R 64 videre *inter.* L3; om. S 66 fuerit: fuerint L3/cognoscet: cognoscit EP3 67 aliquando comprehendit *transp.* EP3R/*post* aliquando *scr. et del.* superficiei Er/per . . . etiam (68) *inter.* L3 71 *post* est *scr. et del.* quod C1/planities fortis *transp.* P1R 72 sui om. C1/sui corporis *transp.* EL3P3R 73 ergo: igitur P1 74 autem om. C1EErL3P3 75 consimilitudine: similitudine EP3R/forme lucis *transp.* S

ficie corporis, et tersitudo comprehenditur a visu ex scintillatione lucis in superficie corporis et ex situ secundum quem reflectitur lux.

[3.194] Et forte in simul aggregantur asperitas et planities
 80 in eadem superficie, scilicet quod sint in superficie alicuius corporis partes diversi situs profunde et prominentes, et sint partes cuiuslibet partium diversi situs prominentium et profundarum ad partes quarumdam consimilis situs, ita quod tota superficies sit aspera, et partes eius, aut quedam, sunt
 85 plane. Et asperitas huiusmodi superficiei comprehenditur a visu ex comprehensione diversitatis situs partium prominentium et profundarum, et planities partium comprehenditur ex forma lucis que comprehenditur a visu in superficiebus partium. Et aliquando visus comprehendit planitiem huiusmodi
 90 partium per intuitionem et ex comprehensione consimilitudinis superficiei cuiuslibet illarum. Secundum ergo istos modos comprehendit visus planitiem, et tersitudinem, et asperitatem.

[3.195] Diafonitas autem comprehenditur a visu per argumentationem ex comprehensione illius quod est in posteriori
 95 corporis diafoni. Et diafonitas corporis diafoni non comprehenditur a visu nisi quando fuerit in eo quedam spissitudo, et fuerit diafonitas eius spissior diafonitate aeris interiacentis visum et ipsum. Si autem fuerit in fine diafonitatis, non comprehendet visus diafonitatem eius, et non comprehendet nisi
 100 illud quod est in posteriori eius tantum. Et cum in eo fuerit quedam diafonitas, comprehendetur a visu propter illud quod est de spissitudine in eo. Et diafonitas eius comprehenditur ex comprehensione illius quod est in posteriori eius, quoniam, quando in posteriori corporis diafoni fuerit lux aut corpus

76 et ... corporis (77) om. P3 79 in om. P1R/aggregantur: aggregatur R/post et² scr. et del. asperitas P1 80 scilicet ... superficie om. P3 81 sint corr. ex sicut L3
 82 post partes add. profunde et prominentes et sint partes P1/diversi: diversit Er
 83 ad corr. ex aut a. m. S/post ad add. quasdam partes vel ad EP1P3R/quod: ut R
 84 sunt: sint R 85 post asperitas add. huius L3/huiusmodi: huius Er; corr. ex huius C1; scr. et del. L3 87 ex ... comprehenditur (88) om. R 90 per corr. ex pro S/et om. P3/consimilitudinis: similitudinis EP3; assimililitudinis L3; corr. ex assimililitudinis a. m. C1 91 post illarum add. et EP3R/ergo om. EP1P3R 92 comprehendit: comprehenditur C1L3/tersitudinem: certitudinem Er 93 autem: quando P1S
 94 in ... diafoni (95): ultra corpus diaphanum R 96 post quando scr. et del. certificaver P1/quedam spissitudo transp. EP3R 97 fuerit diafonitas corr. ex diafonitas fuerit S/eius rep. L3 98 ante visum add. inter R/autem om. C1EErP3/post fuerit add. diafonitas P1S/diafonitatis om. P1S 99 comprehendet: comprehendit P1S
 100 in ... eius: ultra ipsum R/in² om. L3 101 post visu add. cum ErL3S (scr. et del. S) 102 et inter. a. m. Er; mg. L3/comprehenditur: comprehendetur C1EL3P3R 103 post illius add. quod est in posteriori illius P1/in ... eius: ultra ipsum R/eius ... posteriori (104) inter. L3 104 in ... diafoni: ultra corpus diaphanum R

- 105 coloratum illuminatum, videbitur apparens in posteriori corporis diafoni. Et visus non sentit diafonitatem corporis quando senserit illud quod est in posteriori eius nisi cum senserit quod color et lux que comprehenditur in posteriori corporis diafoni est lux et color in posteriori corporis diafoni, et non est
- 110 color et lux ipsius corporis diafoni. Si autem non, non sentiet diafonitatem corporis diafoni. Si ergo in posteriori parte corporis diafoni non fuerit lux nec corpus illuminatum, nec in circuitu eius, et non apparuerit in posteriori eius nec in alia parte aliqua lux aut color, diafonitas illius corporis non comprehenditur. Et hoc erit quando corpus diafonum fuerit applicatum in aliquo corpore spisso, et illud corpus spissum fuerit continens ipsum, aut respiciens ipsum contra quoque, et corpus diafonum fuerit obscuri coloris. Quoniam tunc visus non sentiet diafonitatem huius corporis.
- 120 [3.196] Et similiter quando in posteriori corporis diafoni fuerit locus obscurus, et non apparuerit in posteriori eius aliqua lux. Cum ergo visus senserit quod color quem comprehendit in posteriori corporis diafoni est color corporis in posteriori corporis diafoni, sentiet diafonitatem corporis diafoni. Et
- 125 similiter, quando corpus diafonum fuerit debilis diafonitatis, et fuerit corpus quod est in posteriori eius et corpora que sunt in circuitu eius debilis lucis, tunc diafonitas eius non comprehenditur a visu nisi apponeretur forma lucis. Cum enim cog-

105 apparens . . . diafoni (106): ultra corpus diaphanum R 106 diafonitatem *corr.* ex diafonitatis P3 107 senserit¹: sentit C1/in . . . eius: ultra ipsum R 108 et: aut L3/comprehenditur: comprehenduntur C1EL3P3R/in . . . diafoni¹ (109): ultra corpus diaphanum R 109 *post lux scr. et del.* ipsius corporis P3/in . . . diafoni: ultra corpus diaphanum R/*post in scr. et del.* posteriori diaphon P1/posteriori . . . lux (110) *om.* P1/corporis diafoni *transp.* S 110 corporis diafoni *transp.* C1/diafoni *om.* EEP3R; *inter.* L3; *corr.* ex diafonitati S/non² *inter.* P1; *om.* P3 111 in . . . diafoni (112): ultra corpus diaphanum R/parte *om.* EL3; *mg.* a. m. C1 112 fuerit: fuit P1/corpus *corr.* ex corporis S 113 in . . . eius: ultra ipsum R/aliam . . . aliqua (114): aliqua alia parte ER 114 aliqua *om.* P3/*post lux scr. et del.* et color S/aut *corr.* ex C1/diafonitas: diafonitatis Er; *corr.* ex diafonitatis L3/non comprehenditur (115) *om.* Er; *inter.* L3 116 in: cum C1EP3R; *alter.* in cum L3/corpore: tempore P1 117 fuerit continens: continuerit R/respiciens: respexerit R/contra: apparebit P1; et fuerit R/contra quoque *om.* S/quoque: edirecto C1/et *om.* R 118 fuerit: tunc P1S; *om.* R 119 huius *corr.* ex huius S 120 in . . . diafoni: ultra corpus diaphanum R/*post diafoni scr. et del.* fuerit S 121 in: scilicet L3/in . . . eius: ultra ipsum R/posteriori *corr.* ex postremo P1/eius *scr. et del.* P3 122 *post lux add.* non comprehendetur diafonitas eius C1EErL3P3R (*mg.* Er/*mg.* a. m. L3/comprehenditur: comprehenditur Er)/quem . . . diafoni (123): qui comprehenditur ultra corpus diaphanum R/comprehendit (123): comprehenderit EP3 123 est . . . diafoni¹ (124) *inter.* EL3 (a. m. E)/*post color add.* et color L3/in² . . . diafoni¹ (124): ultra corpus diaphanum R 124 corporis²: coloris ERL3P1S/*post corporis² scr. et del.* coloris C1 126 in . . . eius: ultra ipsum R 128 apponeretur: apponatur R; *alter.* in opponeretur C1/forma lucis: forti luci C1EErL3P3R/enim: autem C1EErL3P3R/cognoscet (129) *corr.* ex cognosceret C1

130 noscet lucem in posteriori eius, comprehendet diafonitatem.
 Secundum ergo istos modos comprehendit visus diafonitatem
 corporum diafonorum.

[3.197] Spissitudo comprehenditur a visu ex privatione
 diafonitatis. Cum ergo visus comprehenderit corpus et non
 135 senserit in ipso aliquam diafonitatem, arguet eius spissitu-
 dinem.

[3.198] Umbra vero comprehenditur a visu respectu lucis
 illuminantis aut partis lucis, quoniam umbra est privatio quar-
 umdam lucium cum illuminatione loci umbre ab extranea luce
 140 privata a loco umbre. Et cum senserit visus illud quod vicina-
 tur ipsum, et fuerit super illud corpus vicinatum lux fortior
 luce que est in loco umbre, sentiet obumbrationem illius loci et
 privationem a luce orienti super corpus vicinans illi. Quoniam,
 quando visus senserit aliquam lucem in aliquo loco, et caruerit
 145 ille locus luce solis aut aliqua luce forti, sentiet obumbrationem
 loci et privationem loci a luce solis aut ab illa luce forti. Et
 forte visus sentiet corpus faciens umbram, et forte non distin-
 guetur ab eo statim corpus obumbrans. Sed tandem visus,
 quando comprehenderit locum in quo est lux debilis et com-
 prehenderit ultima corpora loco lucis debilis esse fortioris lucis
 150 illa luce debili, sentiet statim umbram illius loci. Secundum
 ergo hunc modum visus comprehendit umbram.

[3.199] Obscuritas vero comprehenditur a visu per argu-
 mentationem ex privatione lucis. Cum ergo visus comprehen-
 derit aliquem locum et non comprehenderit in ipso aliquam
 155 lucem, sentiet obscuritatem eius.

[3.200] Pulcritudo comprehenditur a visu ex comprehen-
 sione intentionum particularium quarum comprehensionis
 qualitas a visu est declarata. Quoniam unaqueque intentio-

129 in ... eius: ultra ipsum R 130 secundum ... diafonitatem om. P3/comprehendit:
 comprehendet R/visus om. P1 134 senserit: sensit E 137 partis om. EEerL3P3;
 inter. a. m. C1/post lucis scr. et del. umbre C1; add. illuminantis aut partis lucis P1; add.
 illuminantis R/post quoniam add. enim R/post umbra add. eius P1/post est scr. et del.
 illuminatio P3 138 lucium corr. ex lucem L3 139 et: itaque R/senserit: sensit
 E/vicinatur ipsum (140): est vicinum ipsi R 140 vicinatum: vicinum R
 141 obumbrationem: umbrationem EP3R; corr. ex umbrationem S 142 orienti:
 oriente R/vicinans: vicinum R 143 lucem corr. ex rem P1 144 solis om. EEerP3;
 inter. C1L3 (a. m. C1)/obumbrationem: umbrationem S 145 ante loci¹ add. illius
 EP3R (post illius scr. et del. spatii P3)/loci¹ om. S/loci² om. C1EEerL3P3R/post luce¹ add.
 orienti EP3/illa: alia C1EEerL3P3R 146 post sentiet add. per C1L3 (scr. et del. L3)/
 faciens corr. ex sentiens L3 147 visus quando (148) transp. R 148 comprehenderit¹:
 comprehendit L3 149 post corpora add. in R/esse corr. ex est S 150 post statim
 scr. et del. o L3 151 ergo hunc transp. P3 154 comprehenderit: comprehendit
 L3S/ipso: eo EP3R 156 post pulcritudo add. autem PIR 158 a visu om. EP3R/
 post declarata add. ante EP3R/unaqueque: unamqueque Er

num particularium predictarum faciet per se aliquem modum
 160 modorum pulcritudinis, et per coniugationes illarum faciunt
 etiam alios modos pulcritudinis. Et visus non comprehendit
 pulcritudinem nisi in formis visibilium que comprehenduntur
 per sensum visus, et forme visibilium sunt composite ex inten-
 tionibus particularibus quarum distinctio iam est declarata. Et
 165 visus comprehendit formas ex comprehensione istarum inten-
 tionum; ipse ergo comprehendit pulcritudinem ex comprehen-
 sione istarum intentionum.

[3.201] Modi autem pulcritudinis qui comprehenduntur a
 visu in formis visibilium sunt multi. Quedam ergo habent
 170 unam causam ex intentionibus particularibus que sunt in
 forma, et causa quorundam non est nisi coniunctio intenti-
 onum adinvicem, non ipse intentiones, et causa quorundam
 est composita ex intentionibus et ex compositione illarum. Et
 visus comprehendit quamlibet ex intentionibus que sunt in
 175 qualibet forma per se, et comprehendit ipsas compositas, et
 comprehendit compositionem et coniugationem illarum. Visus
 ergo comprehendit pulcritudinem secundum diversos modos,
 et omnes modi ex quibus visus comprehendit pulcritudinem
 revertuntur ad comprehensionem intentionum particularium.

180 [3.202] Si vero iste intentiones particulares faciunt pulcri-
 tudinem et composite (et est dicere facere pulcritudinem indu-
 cere dispositionem in anima qua videtur ei quod sit res pulcra
 quod videtur), et hoc apparebit per modicam inspectionem.
 Quoniam lux facit pulcritudinem, et propter hoc apparebunt
 185 pulcra sol, et luna, et stelle, et non est in sole, luna, et stellis
 causa propter quam apparebunt decora nisi lux earum. Lux

159 predictarum: predicta P1S/modum om. EP3 160 modorum om. P1R/per om.
 P1RS/post per scr. et del. cog Er/coniugationes: coniunctionem C1; coniugationem EL3P3
 161 etiam alios transp. EP3 163 post ex scr. et del. ind P1 164 iam est transp. Er
 166 ipse... intentionum (167) mg. a. m. S/post ergo add. visus C1 168 qui: que ErL3;
 corr. ex que C1 169 in... visibilium inter. a. m. S/post ergo add. visibilia R
 171 coniunctio... adinvicem (172): intentionum... coniunctio EP3R 172 adinvicem:
 inter se R 173 compositione: comprehensione P1 174 comprehendit:
 comprehendet L3/post comprehendit scr. et del. quem P3/ex intentionibus: intentio-
 num C1EErL3P3R 176 coniugationem: coniunctionem C1 177 post ergo add.
 non P1/pulcritudinem: pulcritudines P1 178 post pulcritudinem scr. et del. vir-
 tutis P3 179 revertuntur ad comprehensionem om. P1/intentionum corr. ex inten-
 tione P3 181 post et¹ add. similiter P1; add. etiam R/composite corr. ex compose Er/
 post composite add. faciunt pulcritudinem C1; add. similiter EP3R/post pulcritudinem²
 add. est R/inducere (182) corr. ex inducte P1 182 videtur: videbitur EP3R/ei om.
 P3/res inter. P1/post pulcra add. aliquando C1 183 quod: que EP3R/quod videtur
 om. C1P1; inter. a. m. S/videtur corr. ex vero Er/hoc: hec C1; cum Er; corr. ex cum C1L3
 (a. m. C1)/post hoc scr. et del. et P1 184 apparebunt: apparebit C1 185 stelle:
 stella EErP1; corr. ex stella a. m. S/stellis: stella P1; corr. ex stella a. m. S

ergo per se facit pulcritudinem.

[3.203] Et color etiam facit pulcritudinem, quoniam quilibet color scintillans, sicut viridis, et roseus, et sibi similia, apparebunt pulcri visui, et delectatur visus in eis. Et propter hoc
190 apparebunt pulcri panni tincti, et flores, et viridaria. Color ergo per se facit pulcritudinem.

[3.204] Et remotio etiam aliquando facit pulcritudinem accidentaliter. Quoniam in quibusdam formis pulcris sunt macule et ruge que faciunt turpitudinem in formis, et cum elongabuntur in visu, latent ille intentiones subtiles que faciunt turpitudinem in illis formis, et apud latentiam illarum intentionum apparebit pulcritudo illius forme. Et similiter etiam in multis formis pulcris sunt intentiones subtiles per quas forma
195 est pulcra, sicut lineatio et ordinatio, et multe istarum intentionum latent visum in multis remotionibus mediocribus. Et quando sunt prope visum, apparebunt ille intentiones subtiles visui, et apparebit pulcritudo forme. Remotio ergo et appropinquo facit pulcritudinem.

[3.205] Et situs aliquando facit pulcritudinem, et plures intentiones pulcre non apparent pulcre nisi propter ordinationem et situm tantum, quoniam omnes distinctiones ordinate quasi punctate non apparent pulcre nisi propter ordinationem. Et scriptura non apparet pulcra nisi propter ordinationem,
200 quoniam pulcritudo non est nisi ex substantione et directione figurarum litterarum et ex compositione earum adinvicem. Si autem compositio litterarum et ordinatio earum non fuerit secundum unam proportionem, scilicet suplet farraginis, ut una magna et alia parva littera, tunc non erit scriptura pulcra,

187 per se om. P1 188 et . . . pulcritudinem inter. a. m. S/etiam om. S 189 et roseus mg. a. m. C1/sibi similia: his similes R 190 delectatur: delcantur P1/in om. R 191 viridaria: viridia EP3R 193 et . . . pulcritudinem rep. P1/accidentaliter (194) corr. ex accidentalem P1 195 in om. C1EErL3P3/formis: formarum C1/elongabuntur (196): elongantur C1L3 196 post latent scr. et del. ruge P3 197 illarum corr. ex earum S 198 post apparebit add. quidem EP3/ante illius add. quidem C1L3 202 quando: que Er; corr. ex que L3/intentiones: remotiones EErL3P3; corr. ex remotiones a. m. C1 203 ergo: extra Er; corr. ex extra L3 205 aliquando: autem P1/facit corr. ex fuit L3 206 apparent: apparebunt P1/ordinationem (207): ordinem EP3 208 quasi om. P3/punctate corr. ex preclare a. m. E/ordinationem: ordinem R 209 et. . . ordinationem om. ErP3S 210 nisi om. EL3P3/ex om. L3/post ex add. sub C1/substantione: distinctione C1; substitutione L3; substantiali P1S; om. R/ante et scr. et del. vel substantione vel substantatione C1; add. vel substantione vel subdistinctione L3/et om. ErP1RS 211 compositione: comparatione L3; corr. ex compressione a. m. C1/adinvicem: inter se R 212 earum om. R 213 suplet scr. et del. C1; om. R/farraginis corr. ex farragilus C1; om. R 214 et om. C1EErL3P3R/parva: una P1/littera om. C1EL3P3R/scriptura om. P3/scriptura pulcra transp. C1EL3R

215 quamvis figure litterarum per se sint bene posite. Et aliquando
apparet scriptura pulcra quando compositio eius fuerit propor-
tionalis, quamvis littere non sint in fine bone dispositionis.
Et similiter plures forme visibilium non apparent pulcre nisi
propter dispositionem et ordinationem partium adinvicem.

220 [3.206] Et corporeitas etiam facit pulcritudinem, et prop-
terea apparent pulcra corpora hominis et multorum ani-
malium.

[3.207] Et figura facit pulcritudinem, et propter hoc luna,
et forme pulcre hominis, et multorum animalium, et arborum,
225 et plantarum non apparent pulcre nisi propter formas eorum,
aut propter figuras partium eorum, aut propter figuras eorum,
aut propter figuras partium forme.

[3.208] Et magnitudo facit pulcritudinem, et propter hoc
apparet luna pulcrior stellis et stelle magne pulciores parvis
230 stellis.

[3.209] Et divisio facit pulcritudinem, et propter hoc stelle
separate sunt pulciores stellis extensis et pulciores stellis
galaxie, et propter hoc candeles distincte sunt pulciores igne.

[3.210] Et continuatio etiam facit pulcritudinem, et propter
235 hoc viridale continuum et plante spisse sunt pulciores dis-
tinctis.

[3.211] Et numerus facit pulcritudinem, et propter hoc loca
celi multarum stellarum sunt pulciora locis paucarum stella-
rum, et propter hoc candeles multe numero in eodem loco nu-
240 merus earum facit pulcritudinem. Et propter hoc loca celi mul-
tarum stellarum sunt pulciora locis laterum.

[3.212] Et motus hominis in sermone et operatione eius.

[3.213] Et quies eius facit pulcritudinem, et propter hoc
apparet pulcra gravitas, et taciturnitas.

215 sint: sunt C1L3P1; corr. ex sunt S/bene posite transp. C1/aliquando corr. ex autem S
216 compositio: proportio P1 217 sint: sunt C1; sit E/bone om. C1 219 adin-
vicem: inter se R 220 propterea (221): propter hoc C1EErL3P3R 221 corpora
hominis transp. P1 223 post et² add. non P1/hoc om. Er 224 hominis: hominum
R/post multorum scr. et del. ai P3 226 partium . . . figuras (227) mg. a. m. E/post aut
scr. et del. ppp P1/figuras eorum transp. C1EL3P3R/eorum² . . . figuras (227) om. Er
228 facit pulcritudinem inter. a. m. Er; om. S 229 parvis stellis (230) transp. EP3R
234 et continuatio: continuato S 235 post plante add. continue et EP3R/post
pulciores scr. et del. sunt P3 238 locis: lucis Er 239 numero om. R/numerus
. . . facit (240): faciunt R 240 earum: eorum L3 (inter.); om. Er; corr. ex parum a. m.
C1/et . . . laterum (241) om. R/loca inter. a. m. E/multarum stellarum (241) corr. ex
stellarum multarum Er 241 sunt om. C1/laterum: claterum P3; corr. ex claritum
a. m. E 242 post et¹ add. etiam EP3R/et² . . . eius: facit pulchritudinem R/operatione:
spiratione P1S; quietate P3; corr. ex spiratione ErL3P3 (spiratione L3; a. m. ErP3); alter.
ex quietatione in spiratione a. m. E 244 pulcra . . . apparet (246) om. P3

245 [3.214] Et asperitas etiam facit pulcritudinem, et propter hoc apparet villositas pulcra in multis pannis.

[3.215] Et planities etiam facit pulcritudinem, et propter hoc apparet pulcra in pannis.

[3.216] Et diafonitas facit pulcritudinem, et propter hoc
250 apparent de nocte micantes diafoni.

[3.217] Et spissitudo facit pulcritudinem, quoniam color, et lux, et figure, et lineatio, et omnes intentiones pulcre apparentes in formis visibilium non comprehenduntur similiter a visu nisi propter spissitudinem et umbram.

255 [3.218] Et umbra facit apparere pulcritudinem, quoniam in multis formis visibilium sunt macule et pori subtiles redentes eas turpes, et cum fuerint in luce solis, apparebunt macule in eis, quare latebit pulcritudo eorum. Et cum fuerint in umbra aut in luce debili, latebunt ille macule et ruge, quare apprehen-
260 ditur pulcritudo eorum. Et etiam tortuositates que apparent in plumis avium et in panno qui dicitur albur almon in umbra non apparent et in luce debili.

[3.219] Et obscuritas facit pulcritudinem apparere, quoniam stelle non apparent nisi in obscuro. Et similiter non appar-
265 et pulcritudo earum nisi in nigredine noctis et in locis obscuris, et latet in luce diei. Et stelle in noctibus obscuris sunt pulciores quam in noctibus lune.

[3.220] Et similitudo facit pulcritudinem, quoniam membra animalis eiusdem speciei, ut oculus oculo, non apparent pulcra
270 nisi quando fuerint consimilia, quoniam oculi, quando fuerint diverse figure, scilicet quod unus sit rotundus et alter longus, erunt in fine turpitudinis. Et similiter, si unus fuerit niger et alter viridis, erunt etiam turpes, et similiter si unus fuerit maior altero. Et similiter si una gena fuerit profunda et altera promi-

245 etiam: et P1; om. C1EL3P3R 246 pulcra inter. a. m. S/post pulcra add. villositas EErl3P3R (ante villositas add. ut EP3R)/in inter. a. m. C1 247 etiam om. C1EL3P3R
248 post pannis add. sericis C1 250 apparent: apparet P3/de: in C1/post diafoni add. lapides C1 252 figure: figura R 254 et umbram om. P3 255 facit apparere transp. C1L3 257 eas: eos ErL3; corr. ex oris a. m. C1/post eas add. res C1/fuerint: fiunt E/solis inter. E 258 pulcritudo corr. ex pulcritudini S/eorum: earum R/fuerint: fuerit P1 259 in om. EP3/illem: iste P1/apprehenditur (260): comprehenditur C1L3; apprehendit Er; comprehendetur R 260 eorum: earum P3R 261 qui: quod C1ErL3S/albur almon: almu elmen P3; amilialmon R; corr. ex almu elmen a. m. E; corr. ex elmu elmen a. m. L3 262 et om. L3 264 post obscuro scr. et del. et similiter non apparent in obscuro P1 265 in¹ om. Er/in locis corr. ex villosis a. m. C1 267 lune: luce P1 268 similitudo: consimilitudo EP1P3/membra: umbra S 269 eiusdem corr. ex eius C1L3 (a. m. C1)/ut oculus: in oculis Er/oculus corr. ex oculis S 270 consimilia corr. ex similia a. m. C1/quando² om. Er 271 unus om. C1 272 similiter: etiam EErl3P3R; om. C1 273 maior: minor P1 274 una om. Er

275 nens, erit in fine turpitudinis, et similiter quando unum super-
ciliarum fuerit grossum et alterum subtile, aut unum illorum
grossum et alterum breve, erunt turpia. Omnia ergo animalium
membra huiusmodi et dupla non erunt pulcra nisi cum fuerint
consimilia. Et similiter picture et littere non apparent pulcre
280 nisi quando fuerint littere que sunt uniusmodi et partes illarum
que sunt huiusmodi consimiles.

[3.221] Et diversitas facit pulcritudinem, quoniam figure
membrorum animalis sunt diversarum partium, et non sunt
pulcre nisi propter illam diversitatem. Quoniam si nasus totus
285 esset equalis grossitudinis, esset in fine turpitudinis, et pulcri-
tudo eius non est nisi propter diversitatem duorum extremo-
rum eius et eius pyramidalitatem. Et similiter pulcritudo su-
perciliarum non est nisi quando extrema eorum fuerint sub-
tiliora residuis anterioribus. Et similiter omnia membra ani-
290 malis, quando quidem intuentur, invenitur quod pulcritudo
eorum non est nisi ex diversitate figurarum partium eorum. Et
similiter scripture, quoniam, si partes eius scripture essent
equalis grossitudinis, non apparerent pulcre, quoniam extrema
litterarum non apparent pulcra nisi quando fuerint subtiliora
295 residuo, quoniam et, si extrema litterarum, et media earum, et
continuatio earum essent uniusmodi spissitudinis, esset scrip-
tura in fine turpitudinis. Diversitas ergo facit pulcritudinem in
multis formis visibilibus.

[3.222] Iam ergo declaratum est ex eo quod diximus quod
300 unaqueque intentionum particularium, quando comprehendun-
tur per sensum visus, aliquando facit pulcritudinem per se. Et
cum sermo fuerit factus de multis corporibus inductive per se,
cum inducentur omnia corpora, invenietur quod quilibet ista-
rum intentionum facit pulcritudinem in multis locis. Et non

275 erit: erunt P1R 277 grossum: longum EP3R/turpia corr. ex turpes a. m. C1/
animalium membra (278) transp. EP3R 278 membra om. Er; corr. ex umbra L3/
huiusmodi: uniusmodi C1EErL3P3R/et dupla om. R/cum om. C1L3/fuerint: sunt C1;
fiunt L3 279 picture et littere: littere et picture EP3R 280 post nisi scr. et del. nis
C1/fuerint om. C1L3/fuerint littere transp. EP3R/littere que sunt: que sunt littere C1
281 huiusmodi: uniusmodi C1EErL3P3R/post consimiles scr. et del. et P1 285 equa-
lis: eiusdem EP3R/esset²: esse P3 287 pyramidalitatem corr. ex pyramidat P3
289 et om. C1/similiter: super S/animalis (290): animalium R 290 quidem: qui Er;
om. R; corr. ex qui L3/intuentur: aspiciuntur R/invenitur: inveniet S 292 similiter:
universaliter P3; corr. ex universaliter a. m. E/quoniam . . . scripture inter. L3/eius om.
EP3R/scripture² om. C1 293 apparerent: appareant C1L3; apparent P1; corr. ex
apparent a. m. P3/pulcre om. P1 294 ante non add. et de media earum et continuatio
earum S 295 et¹ om. R 296 uniusmodi: unius R/ante esset scr. et del. esset S
299 ergo rep. P3 300 comprehenduntur (1): comprehenditur EP3R; alter. in
comprehenditur L3 1 aliquando: a natura P1 3 cum inter. a. m. E 4 ante
intentionum add. formarum vel EP3/post multis scr. et del. formis visibilibus P1

- 5 diximus ea que diximus ex eis nisi gratia exempli et ut possent
adquiri alia exempla per illa. Sed tamen iste intentiones non
faciunt pulcritudinem in omnibus locis, nec una istarum inten-
tionum facit pulcritudinem in qualibet forma in qua pervenit
illa intentio; sed in quibusdam formis, et in quibusdam non.
10 Verbi gratia, quod non quelibet magnitudo facit pulcritudinem
in quolibet corpore alicuius magnitudinis, et similiter non qui-
libet color facit pulcritudinem, nec inde color facit pulcritudi-
nem in quolibet corpore in quod pervenit ille color. Et similiter
non quelibet figura facit pulcritudinem. Sed quelibet illarum
15 intentionum quas diximus facit pulcritudinem per se; sed in
quibusdam locis, in quibusdam non, et secundum quosdam
modos, et secundum alios non.

[3.223] Et etiam iste intentiones faciunt pulcritudinem per
coniugationem illarum adinvicem, quoniam scriptura pulcra est
20 illa cum figure litterarum sunt pulcre et compositio illarum ad-
invicem est compositio pulcra, quoniam scriptura in qua adun-
antur iste due intentiones est pulcrior scriptura in qua est una
istarum duarum intentionum tantum. Finis ergo pulcritudinis
scripture non est nisi ex coniugatione figure et situs.

- 25 [3.224] Et similiter, quando colores scintillantes et picture
fuerint ordinata ordinatione consimili ordinata, sunt pulciores
coloribus et picturis carentibus ordinatione consimili. Et simi-
liter pulcritudo apparet in forma hominum et animalium ex
coniunctione vel ex coniugatione (quod idem est) intentionum
30 particularium que sunt in eis. Quoniam magnitudo oculorum
mediocris cum figura eius amigdalata est pulcrior oculo qui
non habet nisi magnitudinem tantum aut figuram amigdalatam
tantum. Et similiter rotunditas faciei cum tenuitate et sub-

5 ea om. P3/ex: de C1L3/ex eis om. R 6 illa: ista EP3R 7 post nec add. in EP3
8 forma om. S/qua: quam R 9 post et scr. et del. non L3 10 quod om. P1RS/non
quelibet om. C1EErL3P3/ante facit mg. non P3 11 corpore om. P1 12 inde:
viridis EP3R; indus P1; alter. in viridis a. m. C1; corr. ex indus a. m. S/post color² add. vel
indus EP3 13 quod: quo P1/illem color transp. Er/et similiter transp. P3 14 sed:
et C1EErL3P3R 15 intentionum corr. ex pulcritudinem S 16 quibusdam¹:
quibus P3/post locis add. et EP3R 18 etiam iste transp. P1/iste om. S 19 con-
iugationem: coniunctionem C1EL3P3R/illarum corr. ex earum P1/adinvicem: inter se
R/pulcra om. L3; corr. ex pulcra P3 20 adinvicem (21): inter se R 23 duarum
intentionum transp. P1/ergo: igitur P1 24 coniugatione: coniunctione C1
26 fuerint corr. ex fuerunt Er/ordinata²: ordinate EP3/pulciores: pulciora P1S/
pulciores coloribus (27) scr. et del. C1 27 et¹ . . . consimili mg. a. m. C1 (ante et add.
pulciora coloribus)/et² om. P1S 29 coniunctione vel ex om. R/ex om. EErP3/
coniugatione corr. ex coniunctione P1/quod . . . est om. R/post quod scr. et del. lo P1/est
mg. S/post intentionum scr. et del. est S 31 ante est add. quod P1 33 similiter:
simiter S/rotunditas corr. ex rotunditat P3

tilitate coloris est pulcrrior quam unum sine altero. Et similiter
 35 parvitas oris cum gracilitate labiorum et mediocritate eorum
 est etiam pulcrrior parvitate oris cum grossitudine labiorum et
 pulcrrior gracilitate labiorum cum amplitudine oris. Et ista in-
 tentio est multe diversitatis et multorum modorum.

[3.225] Et cum feceris inductionem in formas pulcras omni
 40 modorum visibilium, invenies quod coniunctio intentionum
 particularium que sunt in formis faciunt in eis modos pulcri-
 tudinis quos non facit una intentionum per se. Et pulcritudo in
 maiori parte non fit nisi ex coniunctione istarum intentionum
 adinvicem, quoniam intentiones particulares quas diximus
 45 faciunt pulcritudinem per se, et faciunt pulcritudinem per
 coniunctionem earum adinvicem.

[3.226] Et etiam pulcritudo fit ex alia intentione preter is-
 tas duas intentiones quas prediximus, et est proportionalitas
 et consonoritas. Quoniam forme composite ex membris diver-
 50 sis et partibus diversis habent figuras diversas, et magnitudi-
 nes diversas, et situs diversos, et continuationem et coniunc-
 tionem, et perveniunt in quamlibet illarum multe intentiones
 particulares. Tamen omnes non sunt proportionales, quoniam
 non quelibet figura est pulcra cum qualibet figura, nec quelibet
 55 magnitudo est pulcra cum qualibet magnitudine, nec quilibet
 situs est pulcr cum quolibet situ, nec quelibet figura cum
 qualibet magnitudine, nec quelibet magnitudo cum quolibet
 situ. Sed quelibet intentionum particularium habet propor-
 tionem cum quibusdam intentionum, et est assimetra quibus-
 60 dam. Verbi gratia, simitas nasi cum profunditate oculorum
 non est pulcra. Et similiter magnitudo nasi cum maxima mag-
 nitudine oculorum non est pulcra, et similiter prominentia
 frontis cum profunditate oculorum non est pulcra, et similiter
 frontis planities cum prominentia oculorum non est pulcrum.

34 ante coloris *add.* cutis et EP1P3R (et *inter.* P1)/quam unum *om.* P1 35 oris: horis
 P1/gracilitate: subtilitate EP3R/eorum *om.* P3R; *inter.* a. m. E 36 etiam *om.*
 C1EErL3P3R/parvitate *corr.* ex gracilitate P1/post parvitate *add.* eorum L3 39 form-
 as: formis R; *corr.* ex formis P3/pulcras: pulcris P3R/omni: omnium C1EP1R
 41 faciunt: facit R 42 quos: quas C1ErL3/intentionum: intentio P1 44 adin-
 vicem: inter se R 46 earum: istarum P1S/adinvicem: inter se R 47 post alia *scr.*
 et *del.* parte P1 48 duas intentiones *transp.* C1L3/prediximus: diximus P3/et alter.
 in id est L3/est: etiam Er; *om.* L3 49 et consonoritas *om.* Er/composite *corr.* ex
 compose Er 50 et . . . diversis *om.* P1 52 qualibet: quamlibet P1RS 53 non
om. Er 54 figura¹: forma P3 56 situ *om.* P1S/nec . . . situ (58) *om.* C1L3
 59 intentionum: intentionibus R/post assimetra *scr.* et *del.* in proportio C1 61 pul-
 cra *corr.* ex pulcrum EP3 (a. m. E)/maxima: magna EP3; *om.* R 62 pulcra: pulcrum
 C1EErL3P3/et . . . pulcra (63) *mg.* a. m. E 63 pulcra: pulcrum C1EErL3P3
 64: pulcrum: pulcra R

- 65 Quodlibet ergo membrorum habet figuram que facit formam
eius pulcram, et cum hoc quolibet figura cuiuslibet membri non
habet proportionem nisi cum quibusdam figuris residuorum
membrorum, et cum aliis non. Et forma fit pulcra per congrega-
tionem figurarum proportionalium.
- 70 [3.227] Et similiter magnitudines, et situs, et ordinatio
eorum, quoniam magnitudo oculorum cum pulcritudine figure
eorum, et cum mediocritate similitatis nasi, et cum magnitudine
proportionali ad magnitudinem oculorum est pulcra. Et simi-
liter amigdaleitas oculorum, et dulcedo et tenuitas figure eius,
75 etsi fuerint parvi, cum subtilitate nasi, et mediocritate figure et
quantitatis eius, erunt pulcri. Et similiter gracilitas labiorum
cum subtilitate oris est pulcra quando subtilitas oris eius fuerit
proportionalis ad gracilitatem labiorum—scilicet quod labia
non sint in fine gracilitatis et os non sit in fine parvitatatis, sed
80 erit parvitas oris mediocris et labia gracilia et cum hoc propor-
tionalia ad quantitatem oris. Et similiter amplitudo faciei,
quando fuerit proportionalis ad quantitates membrorum faciei,
erit pulcra—scilicet cum facies non sit in fine amplitudinis, et
membra faciei sunt proportionalia ad quantitates totius faciei.
- 85 Quoniam, quando facies fuerit ampla maxime amplitudinis, et
membra que sunt in ea sunt parva non proportionalia ad
quantitatem eius, non erit facies pulcra, quamvis quantitates
membrorum sint proportionales, et figure eorum sunt pulcre.
Et similiter, quando fuerit parva facies et stricta, et membra
90 eius fuerint magna (membra dico faciei), erit facies turpis. Et
cum membra fuerint proportionalia inter se et proportionalia
ad quantitatem amplitudinis faciei, erit forma pulcra, quamvis
membra per se non sint pulcra.

65 quodlibet ergo *transp.* C1L3/ergo membrorum *transp.* P3/membrorum: mem-
brum L3 66 cum hoc: etiam R 67 quibusdam *corr.* ex quibus P3 68 pulcra
corr. ex forma P3/congregationem (69): cognationem P1 71 post eorum *add.* facit
hoc C1 73 post magnitudinem *scr.* et *del.* eorum P1 74 amigdaleitas: amigdalitas
C1L3R; amigdalinitas E; amigdalitatis P3/post et¹ *scr.* et *del.* ducta P3/et²: nec S
75 et² *om.* C1EL3P3R 76 post eius *scr.* et *del.* et L3 77 subtilitas: gracilitas R/oris²
om. P3/eius *om.* R/post eius *scr.* et *del.* su P3/post fuerit *inter.* debite P3 78 labia
om. P1 79 sint: sunt C1P3/gracilitatis . . . fine *mg.* L3/et . . . parvitatatis *mg.* a. m. C1/
post non² *scr.* et *del.* non P3/sit: erit L3; *om.* EP1P3S 80 parvitas *corr.* ex parvitatatis P3/
cum hoc: praeterea R/hoc: hec L3 81 post et *add.* tunc fiet pulcritudo et C1/post
faciei *scr.* et *del.* non Er 82 quando fuerit *transp.* Er 83 scilicet: sed L3/cum:
quando P3; quod R 84 sunt: sint R/quantitates: quantitatem R/totius faciei
transp. C1EErL3P3 87 quantitatem: quantitates EP3/post quamvis *scr.* et *del.* facies
C1/quantitates membrorum (88) *transp.* C1 88 proportionales *corr.* ex proportiones
P3/sunt: sint EErP3R; *alter.* in sint C1 90 fuerint: fiunt L3P1 91 fuerint: sint EP3
92 post quantitatem *scr.* et *del.* illius p P1/quamvis: quam P1 93 sint: sunt C1;
fuerint P1S

[3.228] Sed proportionalitas tantum facit pulcritudinem.
 95 Cum ergo in forma congregabitur pulcritudo figure cuiuslibet
 partis eius, erit pulcritudo quantitatis et compositionis earum,
 et proportionalitas membrorum secundum figuras, et magni-
 tudines, et situs, et fuerint cum hoc proportionalia ad totam
 figuram faciei et quantitatem eius, erit in fine pulcritudinis.

100 [3.229] Et similiter scriptura non erit pulcra nisi quando
 littere eius fuerint proportionales in figura, et quantitate, et
 situ, et ordine. Et similiter de omnibus modis visibilium cum
 quibus congregantur partes diverse.

[3.230] Et cum consideraveris formas pulcras de omnibus
 105 modis visibilium, invenies quod proportionalitas facit pulcri-
 tudinem magis quam aliqua alia intentio, vel etiam alique con-
 iuncte per se. Et cum considerabuntur intentiones pulcre quas
 faciunt intentiones particulares per coniunctionem earum adin-
 vicem, invenietur quod pulcritudo que apparet ex coniunctione
 110 illarum non apparet nisi propter proportionalitatem illarum
 intentionum coniunctarum inter se. Quoniam non quandocum-
 que adunabuntur ille intentiones fit pulcritudo; sed in quibus-
 dam formis, et in aliis non. Et est propter proportionalitatem
 que contingit inter illas intentiones. Pulcritudo ergo non est
 115 nisi ex intentionibus particularibus, et perfectio eius est ex
 proportionalitate et consonantia que fit inter intentiones par-
 ticulares.

[3.231] Iam ergo declaratum est ex omni quod diximus
 quod forme pulcre comprehense a visu non sunt pulcre nisi ex
 120 intentionibus particularibus que comprehenduntur per sensum
 visus, et ex coniunctione earum adinvicem, et ex proportionali-
 tate earum adinvicem. Et visus comprehendit intentiones par-
 ticulares predictas simplices et compositas. Cum ergo visus

94 tantum: tantummodo EP3R 95 ergo: igitur P1/in inter. ErL3 (a. m. Er)
 96 post eius scr. et del. eit P1/compositionis: compositio EE; corr. ex compositio L3P3/
 earum om. R; corr. ex eorum P1 97 proportionalitas: proportionalitatis C1/post
 figuras add. tantum P1/et² om. S 98 post situs scr. et del. fu S/cum hoc: praeterea R
 99 et: ad S; inter. L3/quantitatem: quantitatam Er; alter. in quantitatam L3
 100 quando corr. ex cum P1 101 littere eius fuerint: fuerint . . . eius C1EL3P3R/in
 corr. ex et a. m. C1 102 de: est cum R/post visibilium scr. et del. invenies S
 104 consideraveris: consideraverit L3 107 cum inter. E 108 adinvicem (109):
 inter se R 110 post illarum¹ add. inter se R/post propter scr. et del. proportionem
 alicem P1/ante illarum² scr. et del. eorum P1/post illarum² add. coniunctionum vel EP3
 111 intentionum: coniunctionum P1; corr. ex coniunctionum ErL3S (a. m. ErS)/quoniam
 corr. ex quando a. m. C1 113 post formis add. fit EP1P3R/post et² add. hoc EP3R/post
 propter add. proportionem vel C1EL3P3 115 post eius add. non EP3R/est m. g. a. m.
 C1/post est add. nisi EP3R 118 est om. S 121 adinvicem: inter se R/et² inter. L3
 122 earum: eorum ErL3/adinvicem: inter se R/intentiones corr. ex intentione P3
 123 post ergo scr. et del. videret P1

comprehenderit aliquam rem visam, et fuerit aliqua intentio in
 125 illa re visa particularis faciens pulcritudinem per se, et intueatur
 visus illam intentionem per se, pervenit forma illius intentionis
 post intuitum apud sentientem. Et comprehendet virtus
 distinctiva pulcritudinem rei vise in qua est illa intentio, quoniam
 forma cuiuslibet rei vise est composita ex multis intentionibus
 130 intentionum quarum divisionem prediximus. Cum ergo visus
 comprehendit rem visam et non distinxit intentiones que sunt in ea,
 non comprehendet pulcritudinem eius. Et cum distinxit intentiones
 que sunt in ea, et fuerit aliqua intentio earum secundum modum
 facientem pulcritudinem in anima,
 135 statim visus apud intuitionem illius intentionis comprehendet
 illam intentionem per se. Et cum comprehendit illam intentionem
 per se, pervenit illa comprehensio apud sentientem, et sic virtus
 distinctiva comprehendet pulcritudinem que est in ea. Et per istam
 comprehensionem comprehendet pulcritudinem illius rei vise.
 140 Cum ergo visus comprehendit aliquam rem visam, et in illa re
 visa fuerit pulcritudo composita ex intentionibus coniunctis,
 et intuens fuerit visus illam rem visam, et distinxit intentiones
 que sunt in ea, et comprehendit intentiones que faciunt pulcritudinem
 per coniunctionem earum adinvicem aut proportionalitatem earum
 adinvicem, et pervenerit illa comprehensio apud sentientem, et
 comparaverit virtus distinctiva illas intentiones adinvicem,
 comprehendet pulcritudinem illius rei vise composite ex
 coniunctione intentionum que sunt in ea. Visus ergo comprehendet
 pulcritudinem illius rei vise composite ex coniunctione
 150 intentionum que sunt in ea. Visus ergo comprehendet pulcritudinem
 que est in visi-

124 comprehendit *corr. ex* comprehenderet P1 125 particularis: particulari EP3;
corr. ex particulare C1/post faciens *add. aliquam EP3/post se add. aliquam R/intueatur*
 (126): intuatur P3 126 visus *corr. ex* vir a. m. C1/intentionis (127): intuitionis EL3P3
 127 intuitum *corr. ex* intuitionem P1/sentientem: membrum sentiens R 128 pul-
 critudinem . . . intentio om. P1 129 ante forma *add. vero* R 130 ante intentionum
add. earum R 132 non . . . ea (133) *mg. a. m. E* 134 post earum *add. que sunt in*
ea EP3R/facientem corr. ex faciendum L3 135 intuitionem: intentionem EP1P3
 136 et om. P3/comprehenderit *corr. ex* comprehenderet Er 137 sentientem: mem-
 brum sentiens R 138 ante que *mg. eius a. m. C1* 139 istam: illam C1/
 comprehendet: comprehenditur C1/pulcritudinem (140): pulcritudo C1 140 ergo:
 igitur P1 142 intuens: intuitus R/intuens . . . visus: fuerit . . . intuens EP3R/visus
 om. S 145 earum¹: illarum P1S/adinvicem^{1,2}: inter se R/earum² om. P3 146 per-
 venerit: pervenit EP3/sentientem: membrum sentiens R/post et *add. cum EP3*
 147 adinvicem: inter se R 148 composite: compositam P1R; *corr. ex* composita a. m.
 S; *alter. in* compositione a. m. E; *alter. in* compositam L3/ex inter. a. m. E 149 visus
 . . . ea (151) om. EE²P3R; *scr. et del. C1* (post composite *add. vel* comparatione illarum
 compositae) 151 comprehendet: comprehendit L3

bilibus ex comparatione illarum intentionum adinvicem secundum modum quem declaravimus.

[3.232] Turpitudine vero est forma carens qualibet intentione
 155 pulcra. Quoniam iam predictum est quod intentiones particu-
 lares faciunt pulcritudinem, sed non in omnibus locis nec in
 omnibus formis; sed in quibusdam, et in aliis non. Et similiter
 proportionalitas non est in omnibus formis; sed in quibusdam
 160 formis, et in aliis non. Forme ergo in quibus non faciunt inten-
 tiones particulares aliquam pulcritudinem per se nec per suam
 coniunctionem, et in quibus non est aliqua proportionalitas
 inter partes earum carent omni pulcritudine, et sic sunt turpes,
 quoniam turpitudine formarum est privatio pulcritudinis in eis.
 Et forte congregantur in eadem forma intentiones pulcre et
 165 turpes, sed visus comprehendet pulcritudinem ex pulcro et
 turpitudinem ex turpibus quando distinxerit et fuerit intuens
 intentiones que sunt in ea. Turpitudine ergo comprehenditur a
 visu in formis carentibus omnibus pulcritudinibus ex privati-
 one pulcritudinis ab eo apud comprehensionem.

[3.233] Consimilitudo autem est equalitas duarum forma-
 170 rum aut duarum intentionum in re in qua sunt consimiles. Cum
 ergo visus comprehenderit duas formas aut duas intentiones
 consimiles in simul, comprehendet consimilitudinem illarum ex
 comprehensione cuiuslibet duarum formarum vel intentionum
 175 et ex comparatione alterius illarum ad alteram. Visus ergo
 comprehendet consimilitudinem in formis et intentionibus con-
 similibus ex comprehensione cuiuslibet formarum et intentio-
 num secundum suum esse et ex comparatione illarum adin-
 vicem.

152 comparatione: compositionem P1; compositione R; corr. ex comprehensione a. m. C1/post comparatione scr. et del. a Er/adinvicem: inter se R 154 qualibet intentione transp. EP3R 155 quoniam iam corr. ex iam quoniam L3/post quoniam add. enim R/post iam add. quidem C1 156 in¹ rep. P1 157 in quibusdam om. E/quibusdam: aliis C1EErL3P3R 159 formis . . . aliis inter. L3/aliis: quibusdam C1EL3P3R/post forme scr. et del. r C1/post ergo scr. et del. visibilium P1/intentiones (160): intentio P1 160 aliquam pulcritudinem transp. EP3R/nec: non P3 161 et om. C1EErL3P3/post et scr. et del. nec E/non om. EP3 162 omni pulcritudine: pulcritudinem P3 164 congregantur: aggregantur EP3R 165 comprehendet: comprehendit C1EErL3P3R/ex . . . turpitudinem (166) om. P1 166 turpibus: turpi R/intuens: intuitus R 167 comprehenditur corr. ex comprehenderunt P1/a visu (168) om. EErL3P3; inter. a. m. C1 169 ab eo om. R/post apud scr. et del. privationem comprehensione P1 173 consimiles inter. a. m. E/in om. R/illarum ex transp. R/post ex scr. et del. consimil P1 174 comprehensione: comparatione P1S/vel: et C1EL3P3 175 comparatione: comprehensione P1S/illarum: earum C1L3; om. S 176 comprehendet: comprehendit C1EL3P3R/formis: forma P3/et: vel R/consimilibus (177) om. S 177 ante ex add. et S/comprehensione: comparatione P1S/et: vel R 178 comparatione: comprehensione EErL3P1S/adinvicem (179): inter se R

180 [3.234] Diversitas autem comprehenditur a visu in formis
diversis ex comprehensione cuiuslibet formarum diversarum, et
ex comparatione alterius illarum ad alteram, et ex comprehen-
sione privationis equalitatis in eis. Diversitas ergo comprehen-
ditur per sensum visus ex comprehensione cuiuslibet formarum
185 et intentionum per se, et ex comparatione eorum adinvicem, et
ex sensu privationis equalitatis a sentiente.

[3.235] Iam ergo complevimus et declaravimus declaratio-
nem qualitatis comprehensionis cuiuslibet intentionum particu-
larium que comprehenduntur per sensum visus. Et declaratum
190 est ex omnibus hoc quod quedam intentiones particulares
comprehenduntur solo sensu, et quedam comprehenduntur per
cognitionem, et quedam per argumentationem et significatio-
nem secundum vias quarum declarationem prediximus. Et iste
sunt intentiones quarum declarationem intendimus in isto
195 opere.

[CAPITULUM 4]

[4.1] Iam declaratum est quomodo visus comprehendit
quamlibet intentionum particularium que comprehenduntur
per sensum visus, et visus non comprehendit nisi formas visibili-
um, que sunt corpora. Sed forme visibilium sunt composite ex
5 intentionibus particularibus predictis, sicut figura, et magni-
tudine, et colore, et situ, et ordine, et sibi similibus. Visus ergo
non comprehendit quamlibet intentionum nisi ex comprehen-
sione formarum visibilium compositarum ex intentionibus par-
ticularibus, et visus comprehendet quamlibet formarum visi-
10 bilium secundum omnes intentiones particulares que sunt in
forma in simul. Et nichil comprehendit visus ex intentionibus
particularibus per se, quoniam nulla intentionum particularium
predictarum est sola per se, nam omnes iste intentiones par-

181 ex: cum C1/post et add. etiam C1 182 ex comparatione inter. a. m. S/compara-
tione: comprehensione Er; corr. ex comprehensione L3 183 ante in add. id est
similitudinis EP3; add. similitudinis P1; add. id est consimilitudinis R 184 cuiuslibet:
cuius P3/post cuiuslibet add. illarum Er 185 eorum: earum C1R/adinvicem: inter
se R 190 est om. C1EL3P3/hoc: his R 192 significationem (193) om. C1L3
193 vias: visas P1P3 194 sunt intentiones transp. C1L3/isto: hoc ER 2 inten-
tionum: intentionem C1L3P1/comprehenduntur: comprehenditur L3 3 formas om.
P1/formas visibilium (4) transp. S 4 post visibilium scr. et del. non E 6 sibi om.
R/post similibus scr. et del. et P3 9 et . . . particularibus (12) mg. a. m. E/formarum:
formam P1S 10 omnes om. EP3R 11 forma: formis R/in simul: visibilis P3R;
corr. ex visibilis E/comprehendit: comprehendet C1 12 particularium om. R
13 intentiones particulares (14) transp. EP3R

15 ticales non inveniuntur nisi in corporibus, et nullum corpus
est in quo est aliqua istarum intentionum sola sine alia. Visus
ergo non comprehendit nisi formas visibilium, sed quilibet
formarum visibilium est composita ex multis intentionibus
particularibus. Ergo visus comprehendit in qualibet formarum
visibilium multas intentiones particulares, et distinguuntur in
20 ymaginatione. Visus ergo comprehendit quamlibet intentionum
particularium apud visionem rei vise coniunctam cum aliqua
intentionum particularium, et ex distinctione eius inter inten-
tiones que sunt in forma comprehendit quamlibet intentionum
per se.

25 [4.2] Et iam declaratum est, et etiam determinatum, quali-
ter visus comprehendit formas visibilium que componuntur ex
intentionibus particularibus. Et quedam intentiones particu-
lares ex quibus componuntur forme visibilium apparent apud
aspectum rei vise, et quedam non apparent nisi post intuitio-
nem et considerationem subtilem, sicut scriptura subtilis, et
30 lineatio subtilis, et diversitas colorum consimilium fere. Et
generaliter omnes intentiones subtiles non apparent visui apud
aspectum rei vise, sed post intuitionem et considerationem. Et
forma rei vise comprehensa per sensum visus est illa que com-
ponitur ex omnibus intentionibus particularibus que sunt ex
35 forma rei vise quas possibile est visum comprehendere. Et
visus non comprehendit veram formam rei vise nisi per com-
prehensionem omnium intentionum particularium que sunt in
forma rei vise. Et cum ita est, forma ergo vera rei vise in qua
40 sunt intentiones subtiles non comprehenditur a visu nisi post
intuitionem.

[4.3] Et etiam cum visus non comprehenderit intentiones
subtiles nisi per intuitionem, et non apparent intentiones sub-

14 in: ex L3 15 est: erit P3 16 comprehendit: comprehendet C1/post visibilium
scr. et del. est composita S 17 formarum: forma EP3R 19 et: quae R/
distinguuntur: distinguuntur R 20 quamlibet: quemlibet L3 21 post cum scr.
et del. qualibet E/aliqua intentionum (22) transp. EP3R 22 intentionum: intentionem
L3/intentionum particularium: intentione particulari C1EErP3R/particularium corr. ex
particulari L3/et: deinde C1EErL3P3R 23 post forma add. et P1; add. etiam S/
comprehendit: comprehendet C1L3/quamlibet: qualibet ErP3/intentionum:
intentionem C1 25 est om. P3/etiam om. C1EL3P3R/post determinatum add. est S
26 comprehendit: comprehendat R 27 intentionibus corr. ex coniunctionibus
a. m. C1 29 vise om. P1 31 subtilis corr. ex sub visu L3 32 subtiles non
apparent corr. ex non . . . subtiles P3 33 ante et² scr. et del. et forma rei vise sed post
intentionem et considerationem L3 39 cum om. P3/ita est transp. P3/est: sit R
42 etiam om. EP3R/comprehenderit: comprehendit P1; comprehendat R 43 appar-
ent: appareant R/intentiones: intuitiones L3

45 tiles visui apud aspectum, quando visus comprehenderit aliquam rem visam, et comprehenderit formam eius, et fuerint in illa re visa intentiones subtiles, intentiones subtiles non apparent per aspectum, sed per intuitionem. Cum ergo visus comprehenderit aliquam rem visam, et non fuerit in ea aliqua intentio subtilis, etiam comprehendet veram eius formam, etsi
50 non certificabit quod illa forma est vera nisi postquam habuerit fortem intuitionem ad quamlibet partem illius rei vise. Et certificaverit quod nulla intentio subtilis est in ea, et tunc certificabit quod forma quam comprehendit est vera forma.

[4.4] Secundum ergo omnes dispositiones non certificat
55 visus formam rei vise nisi per considerationem omnium partium rei vise et per intuitionem omnium intentionum que possunt apparere in re visa.

[4.5] Et cum hoc est declaratum, dicamus quod comprehensio visibilium erit secundum duos modos, et sunt comprehensio superficialis et comprehensio per intuitionem que profundum aspicit. Quoniam, quando visus aspicit rem visam, comprehendet intentiones manifestas que sunt in ea apud aspectum. Deinde, si preter illud intuerit ipsum et consideraverit omnes partes eius, certificabit formam eius. Si autem non
60 intuerit partes eius, comprehendet formam non certificatam, et illa forma aut eius forma vera erit (sed ipse non certificat quod forma eius sit vera), aut non erit forma eius vera. Et cum ita est, comprehensio ergo visibilium a visu erit secundum duos modos: et comprehensio superficialis, que est in primo aspec-

44 visui *corr. ex visu a. m. L3/post aspectum add. rei visae R/quando corr. ex quoniam P1/post quando add. autem C1EErL3P3; add. igitur R/aliquam . . . comprehenderit (45) om. S* 45 *post et¹ add. non EP3 (inter. a. m. E)/post et² add. non C1EErL3P3/fuerint: fuerit ErP1S* 46 *intentiones subtiles¹ transp. R/post subtiles¹ add. et ErL3/intentiones subtiles² om. C1EL3P1S/ante non add. que interius C1; add. que EP3* 47 *per² om. Er* 49 *etiam om. C1EErL3P3R/etsi: quamvis R* 50 *post illa add. eius L3/forma est vera: est vera forma C1; vera est forma L3 (est inter. a. m.)/post nisi scr. et del. si Er* 51 *ad: super C1EErL3P3R/quamlibet: qualibet S/post illius scr. et del. o C1* 52 *intentio corr. ex intentione P1/post subtilis scr. et del. est L3* 56 *post omnium add. partium C1/intentionum: partium EP3R* 57 *re visa transp. P3* 58 *est declaratum transp. P1S* 59 *et: qui EP3R; om. C1ErL3/sunt om. C1ErL3S* 60 *intuitionem: inductionem Er; corr. ex inductionem L3S (a. m. S)* 61 *quando visus transp. P1/post rem scr. et del. rem P1* 62 *comprehendet: comprehendit C1EL3P3R/intentiones: intuitiones P3/apud corr. ex asp P3* 63 *illud om. L3/intuerit: intuetur P3; inspexerit R; corr. ex intuetur a. m. E/ipsam: ipsam R* 64 *eius² om. P1* 65 *intuerit: intuetur EP3R/non rep. P1; om. R* 66 *post forma¹ add. que est in visu EP1P3R/eius: erit C1/eius . . . erit: erit vera eius forma EP3R/vera erit transp. C1ErL3/erit: eius C1* 67 *forma eius sit: sit . . . eius C1ErL3/forma¹ . . . vera¹: sit vera eius forma EP3R/sit corr. ex si a. m. P3* 68 *est: sit R/a visu om. R* 69 *post et add. est R*

70 tu, et comprehensio per intuitionem. Comprehensio autem per
primum aspectum est comprehensio non certificata, et com-
prehensio per intuitionem est comprehensio per quam certifi-
cantur forme visibilium.

[4.6] Et cum hoc declaratum est, dicamus quod intuitio per
75 quam comprehenduntur forme vere visibilium erit per ipsum
visum, et erit per distinctionem. Quoniam iam declaratum est
in distinctione linearum radialium quod forme que a visu com-
prehenduntur ex axe radiali et ex illo quod est prope axem
sunt manifestiores et maioris certificationis formis que com-
80 prehenduntur ex residuis verticationibus. Cum ergo visus fue-
rit oppositus alicui rei vise, et illa res visa non fuerit in fine par-
vitatibus sed alicuius quantitatis, et visus fuerit fixus in opposi-
tione eius apud aspectum illud quod opponitur medio visus ex
illa re visa, et fuerit super axem aut prope axem, erit manifes-
85 tius partibus residuis rei vise. Et visus percipit istam disposi-
tionem, quoniam, quando comprehenderit rem visam totam,
inveniet locum oppositum medio eius cuius forma pervenit in
medio visus esse manifestiorem partibus residuis.

[4.7] Et superius declaratum est quod ista intentio apparet
90 sensui quando res visa fuerit magne quantitatis. Cum ergo
visus comprehenderit totam rem visam, inveniet quod forma
partis opposite medio eius est manifestior omnibus partibus
residuis, et cum voluerit certificare formam rei vise, movebitur
ita quod medium eius sit oppositum cuilibet parti partium rei
95 vise. Et sic comprehendet formam cuiuslibet partis partium rei
vise comprehensione manifesta certificata sicut comprehendit
partem oppositam medio eius apud aspectum rei vise. Cum
igitur sentiens voluerit certificare rem visam, movebitur visus
ita quod sit medium eius oppositum cuilibet parti partium rei
100 vise, et per istum modum comprehendet formam cuiuslibet

70 ante per¹ add. que est EP3R/comprehensio² . . . intuitionem (72) mg. a. m. E 74 est:
sit R/dicamus: dica ergo P1 75 comprehenduntur: comprehenditur Er/forme vere
transp. R 76 est om. ErL3 77 visu corr. ex visui L3 78 ex¹: ab C1L3/radiali
corr. ex radialium Er/quod: qui R/prope: proprie P1 79 manifestiores: manifestioris
L3; corr. ex manifestioris a. m. C1; corr. ex manifeste P3/et om. L3/maioris: maiores EP3/
certificationis: manifestationis C1EL3P3/comprehenduntur (80): comprehenditur Er
80 ergo: igitur EEerL3P3 81 et . . . visa om. P1/visa om. P3 82 fuerit om. P3/fixus
corr. ex fixi Er 83 apud om. P3 84 aut . . . axem inter. L3 86 quando
comprehenderit corr. ex comprehenderit quando S/comprehenderit: comprehendit EP3
87 post cuius mg. est a. m. C1/post forma add. que C1EEerL3P3 88 medio: forma P1S;
medium R/esse . . . residuis om. P1 92 partis rep. P1/post opposita add. in L3/post
eius scr. et del. quod P1/est inter. a. m. E 94 quod: ut R/oppositum: oppositionem
S/parti om. C1 96 post manifesta add. et R 97 eius om. P1S 98 igitur:
ergo C1L3 99 quod: ut R/oppositum: oppositionem S/cuilibet: cuiuslibet P3

partium rei vise valde manifeste.

[4.8] Et virtus distinctiva distinguet omnes formas venientes ad ipsam, et distinguet colores partium, et diversitatem colorum, et ordinationem partium adinvicem—et generaliter
 105 omnes intentiones rei vise que apparent per intuitionem et formam totius rei vise compositam ex illis partibus et ex illis intentionibus. Secundum ergo hunc modum erit certificatio cuiuslibet partium rei vise secundum suum esse et certificatio
 110 omnium intentionum rei vise. Et non certificatur forma cuiuslibet partium rei vise nisi post motum visus super omnes partes, et cum hoc natus est visus ad motum intuitionis et ad faciendum axem radialem transire super omnes partes rei vise. Cum ergo virtus distinctiva quesierit intueri rem visam, movebitur axis radialis super omnes partes rei vise. Et cum inten-
 115 tiones subtiles que sunt in re visa non apparent nisi per motum visus et pertransitum axis aut radialium linearum que sunt prope ipsum super quamlibet partium rei vise, non perveniet forma rei vise certificata apud sentientem (quando corpus eius fuerit alicuius quantitatis) nisi per motum visus et per opposi-
 120 tionem cuiuslibet partium rei vise medio visus.

[4.9] Et etiam, quando res visa fuerit in fine parvitatatis et non fuerit opposita medio visus etiam, non complebitur intuitio eius nisi postquam movebitur visus donec axis pertranseat in illam rem visam; et perveniet forma illius rei vise in medium
 125 visus, et appareat forma rei vise. Et cum ita est, intuitio per quam visus comprehendit veras formas visibilium forte erit per ipsum visum et forte per distinctionem in simul. Comprehen-
 130 sio ergo forme vere rei vise non erit nisi per intuitionem, et intuitio per quam certificatur forma rei vise non complebitur nisi per motum visus. Et cum corpus rei vise fuerit alicuius quantitatis, non complebitur intuitio eius nisi per motum axis

103 et¹ om. L3 104 adinvicem: inter se R/post generaliter add. distinguet R
 105 rei vise om. L3/intuitionem: intuitum EP3R 106 compositam: oppositam L3/
 partibus... illis om. EP3R 109 certificatur forma: certificat formam P3 111 cum
 hoc: praeterea R/intuitionis: intentionis P1 112 post axem scr. et del. ro P1/
 radialem: radiale Er 113 ergo virtus corr. ex virtus ergo S 114 post cum add.
 omnes C1L3 115 post in add. illa EP3R/apparent: appareant R 116 pertransitum:
 per transitum R/radialium linearum transp. C1EL3P3R 117 ipsum: ipsam EErP3;
 corr. ex ipsam L3/quamlibet: qualibet P1/perveniet: pervenit Er; corr. ex pervenit S
 118 apud: ad R 120 cuiuslibet corr. ex cuius L3 121 post visa scr. et del.
 visus L3 122 etiam: et C1EErL3P3 (scr. et del. C1) 123 movebitur: motus fuerit
 R/pertranseat: transeat C1EErL3P3R 124 in¹ om. Er/perveniet: pervenit Er; per-
 veniat R 125 appareat: apparet EL3P3; corr. ex apparet a. m. C1/est: sit R/per:
 post P3 127 ante in add. visibilis P3/in om. R/in simul corr. ex visibilis a. m. E
 128 et intuitio (129) om. P3 129 certificatur: certificabitur EP3R/complebitur corr.
 ex comprehenditur P1 130 corpus: forma P3

radialis in omnes dyametros rei vise. Et istam intentionem
voluit dicere ille qui opinabatur quod visio non fuerit nisi per
motum et quod nulla res visa videbitur tota simul, quoniam
135 ipse intendebat dicere visionem certificatam que non potest
esse nisi per intuitionem, et per motum visus, et per motum
axis radialis super omnes diametros rei vise.

[4.10] Quomodo vero sentiens certificat per intuitionem et
motum formam rei vise est quia, quando visus fuerit oppositus
140 rei vise, sentiens etiam comprehendet totam formam apud
oppositionem comprehensione qualicumque, et comprehendet
partem que est apud extremum axis vera comprehensione in
fine veritatis. Et cum hoc, tunc comprehendet quamlibet
145 partium residuarum forme aliqua comprehensione. Deinde,
quando visus movebitur et mutabitur axis a parte in qua erat
ad aliam partem, comprehendet sentiens in ista dispositione
formam totius rei vise secunda comprehensione, et compre-
hendet partem eius que est apud extremum axis secunda
150 comprehensione etiam. Et cum hoc erit comprehensio istius
partis que est apud extremum axis in secunda dispositione
manifestior comprehensione eius in prima dispositione, et in
ista dispositione etiam comprehendet sentiens partes residuas
aliqua comprehensione. Et similiter, quando axis mutabitur
per motum ad tertiam partem, comprehendet sentiens in tertia
155 dispositione totam rem visam tertia comprehensione, et com-
prehendit partem que est apud extremum axis tertia compre-
hensione etiam, et erit comprehensio istius partis ab eo in ista
dispositione manifestior comprehensione in duabus primis
dispositionibus. Et cum hoc sentiens comprehendet in ista
160 dispositione etiam quamlibet partium residuarum aliqua com-
prehensione. Per motum ergo visus super partes rei vise ad-

133 voluit: voluerit *P1/post* qui *add.* quidem *P3/fuerit*: fieri *R* 134 videbitur:
videtur *EP3*; videretur *R/post* tota *add.* in *P1* 135 intendebat: intendebit *L3*
136 *post* esse *add.* certificata *P3* 138 certificat: certificet *R/post* et *add.* per *EP3R*
139 formam: forme *S* 140 etiam *om.* *C1EErL3P3R*/etiam comprehendet: compre-
hendit etiam *P1/apud om.* *P1* 141 oppositionem: oppositam *P1/comprehensione*:
comprehensionem *Er/post* et *scr. et del.* q *L3/comprehendet*: comprehendit *EP3*
142 partem *om.* *Er* 143 *post* fine *add.* axis *P3/cum* hoc: etiam *R/post* hoc *scr. et del.*
per axem *C1/comprehendet*: comprehendit *C1*; *om.* *EErP3R*; *inter.* *L3/post* quamlibet
add. partem *EP3R* 144 partium residuarum *transp.* *EP3R/post* partium *add.* forma-
rum *P1S* 145 erat: erit *P1S* 148 partem *om.* *P1/eius om.* *EErL3P1P3R*; *mg.*
a. m. *C1* 149 cum hoc *om.* *R* 152 etiam *om.* *P1/comprehendet* sentiens
transp. *EP3R* 156 partem *om.* *P3/extremum*: extremitatem *EP3R* 157 etiam
om. *P1S* 159 et *inter.* *a. m.* *E/cum* hoc: tunc *R/sentiens corr.* ex sentiet *L3*
160 *post* etiam *add.* in *P1/quamlibet*: qualicumque *P1* 161 super: suas *P1*

quirit sentiens duas dispositiones quarum altera est frequen-
tatio comprehensionis totius rei vise; et secunda est que com-
prehendit quamlibet partium rei vise per axem radialem aut
165 per illud quod est prope axem radialem manifesta compre-
hensione. Apparet ergo sensui omne quod est possibile
apparere ex illis partibus. Et cum sentiens sepe comprehen-
derit totam rem visam et quamlibet partium rei vise, compre-
hendet per istam dispositionem omne quod possibile est
170 comprehendi ex illa re vise.

[4.11] Et cum hoc comprehensione multotiens iterata et in
duabus duplicationibus et iterationibus comprehensionis totius
rei vise distinguit virtus distinctiva illud quod apparet ex
coloribus partium, et luce, et magnitudine, et remotione, et
175 figura, et situ earum, et equalitate illarum que sunt consimiles
in istis distinctionibus, et diversitate earum que sunt diverse in
omnibus istis intentionibus aut in quibusdam, et ex ordine par-
tium adinvicem. Et comprehendit ex distinctione omnium is-
tarum intentionum et comparatione istarum intentionum ad ea
180 que cognoscuntur ex similibus earum formam compositam ex
omnibus istis. Et sic signatur in ymaginatione forma composi-
ta ex omnibus similibus intentionibus, et sic certificatur forma
rei vise per quam appropriatur illa res visa apud sentientem.
Secundum ergo hunc modum certificat sentiens per intuitionem
185 formas visibilium.

[4.12] Et etiam dicamus quod visus, quando comprehendit
aliquam rem visam, et fuerit certificata forma eius apud senti-
entem, forma illius rei vise remanet in anima, et figurabitur in
ymaginatione. Et iterabitur comprehensio rei vise, et erit forma
190 eius magis fixa in anima quam forma rei vise quam visus non
comprehendit nisi semel aut raro. Et dico quod visus, quando

162 altera *corr. ex alter L3* 163 *post secunda add. que P3/comprehendit (164):*
comprehendet L3 168 *totam corr. ex motam L3/totam rem visam: rem . . . to-*
tam C1EL3P3R 169 *post quod add. est Er/possibile est transp. C1EL3P3R*
170 *ex: ab C1EL3P3R* 171 *hoc: hac C1P1R; om. S/et² om. C1ErL3P3R* 172 *dua-*
bus om. C1EErL3P3R/comprehensionis: comprehensione Er/comprehensionis . . . vise
(173): totius rei vise comprehensionis L3 175 *illarum corr. ex earum S* 176 *ea-*
rum om. EL3P3; mg. a. m. C1 177 *post omnibus add. etiam C1EL3P3/et om. L3/ex*
inter. C1 178 *adinvicem: inter se R* 179 *et: at C1/et . . . intentionum*
om. EL3P1P3RS; mg. a. m. C1 180 *cognoscuntur: cognoscunt EE; cognoscit P3/*
similibus: consimilibus P3/formam: formarum S 181 *istis om. R/post istis scr. et del.*
intentionibus E/sic rep. E; inter. L3/signatur: figuratur C1; corr. ex figuratur L3
182 *similibus: istis C1EL3P3R; illis Er* 186 *visus quando transp. R/comprehendit:*
comprehenderit R 187 *post rem scr. et del. suam P3* 188 *figurabitur: figuratur*
R/in² om. S; inter. ErL3 189 *iterabitur: iteratur R/comprehensio corr. ex*
comprehensione Er 190 *quam²: quia EErP1P3S; corr. ex quia C1L3 (a. m. C1)*
191 *dico om. C1EErL3P3R/post dico add. etiam C1/quod visus mg. a. m. C1/quando*
om. P3

comprehenderit aliquod individuum, deinde comprehenderit
 alia individua illiusmodi individui, et iterabitur comprehensio
 individuorum frequenter, quiescet forma illiusmodi in anima, et
 195 perveniet forma universaliter figurata ymaginatione. Et signifi-
 catio super hoc quod forme visibilium remanent in anima et in
 ymaginatione est quia homo, quando meminit de aliquo homi-
 ne quem cognovit ante, et certificavit formam eius, et fuerit
 memorans tempus in quo vidit illum hominem et locum vera
 200 memorazione, statim ymaginabitur formam illius hominis, et
 figuram faciei eius, et situm eius in quo erat in illo tempore. Et
 ymaginabitur locum in quo vidit ipsum, et forte ymaginabitur
 alia visibilia que fuerunt presentia in illo loco in quo vidit
 ipsum. Et hec est significatio manifesta quod forma illius
 205 hominis et forma illius loci sunt fixa in anima et remanentia in
 ymaginatione. Et propter hoc, quando homo fuerit memorans
 de aliqua civitate quam vidit, ymaginabitur formam illius
 civitatis, et formas locorum in quibus fuit in illa civitate, et
 formas individuorum que cognovit in illa civitate. Et similiter
 210 omnia que homo vidit ex visibilibus, quando ei occurrunt ad
 memoriam, ymaginabitur formas eorum secundum modum et
 esse que percepit circa ea ante. Ymaginatio ergo formarum
 visibilium quas ante homo vidit et modo sciverit cum sunt
 absentes est significatio quod forme visibilium quas visus
 215 comprehendit perveniunt in anima et figurantur in
 ymaginatione.

[4.13] Quod vero forma rei vise cuius comprehensio iter-
 abitur a visu est magis fixa in anima et in ymaginatione quam
 forma rei vise cuius comprehensio non iterabitur est quia,

192 *post aliquod scr. et del. ad S* 193 *alia individua inter. a. m. E/post individua scr. et del. d P1/illiusmodi: eiusmodi R/iterabitur: iterata fuerit R* 195 *post figurata add. in C1EP1P3R/ymaginatione (196): ymaginatio S; corr. ex ymaginatio L3* 196 *remanent: remaneant R; remanet S* 197 *meminit: meminerit C1R* 198 *certificavit: certificaverit C1R/formam: forma S/fuerit memorans (199): meminerit R* 199 *tempus: ipse C1; hominem om. P1S* 200 *memorazione: rememorazione P1* 201 *eius²: illius EP3R/post quo scr. et del. ea C1* 202 *vidit corr. ex dividit P3* 203 *post fuerunt add. in C1EL3P3/in quo: quando P3R; corr. ex quando a. m. E* 204 *quod: quia Er* 205 *fixa: fixe EP3R/remanentia: remanentes P3; remanent R* 206 *post hoc add. cum hoc P3/fuerit memorans: meminerit R* 207 *quam corr. ex quod a. m. C1* 208 *formas: formam EP3R/post formas add. illorum C1L3/locorum om. L3/fuit: fuerit Er/et² . . . et (209) om. P3* 209 *et om. E* 210 *omnia: omnium R/homo om. P1R* 211 *eorum om. R* 212 *que: ut R/circa om. R/ante: antea C1L3R; aut S/post ante add. ea EP3/ergo corr. ex eorum Er* 213 *ante homo transp. EP3R/sciverit: scivit C1EErL3P3/cum: quod C1EErL3P3* 214 *est: et P3; inter. a. m. E/visus om. EP3R* 215 *comprehendit alter. in comprehendit deinde corr. ex comprehendit a. m. C1/perveniunt: perveniant C1; pervenerint P1/figurantur corr. ex figurabitur S* 217 *vero om. C1L3* 218 *est: sit R* 219 *cuius inter. L3/post est scr. et del. quia P3*

- 220 quando ad animam venit aliqua intentio, statim perveniet
forma illius intentionis in anima. Et cum tempus pertransierit
et prolongaverit, et non redierit iterum ad animam, forte trade-
tur illa intentio oblivioni ab anima aut aliqua intentionum que
sunt in illa intentione. Et si redierit ad animam ante oblivio-
nem, renovatur forma illius in anima, et rememorabit anima
225 per formam secundam formam primam. Et cum multotiens
iterabitur eventus illius intentionis super animam, erit anima
magis rememorans de illa intentione, et sic erit illa intentio
magis fixa in anima.
- 230 [4.14] Et etiam in prima vice in qua intentio venit ad ani-
mam aut in qua forma rei vise venit ad animam forte anima
non comprehendet omnes intentiones que sunt in illa forma nec
certificabit ipsas. Et comprehendet quasdam intentiones que
sunt in ea, et cum forma redierit secundo, comprehendet anima
235 ex ea aliquid quod in prima vice non comprehendidit, et quan-
to magis forma iterabitur super animam, tanto magis manifes-
tabitur ex ea quod non prius apparebat. Et cum anima com-
prehenderit ex forma intentiones subtiles eius et certificaverit
formam eius, erit magis fixa in anima et magis fixa in ymagina-
240 tione quam forma ex qua vere non comprehendit mens omnes
intentiones que sunt in ea. Et cum anima comprehenderit ex
forma omnes intentiones que sunt in ea ex prima vice, deinde
iterabitur eventus forme super ipsam, et comprehenderit in
ipsa secundo intentionem, plus certificabit quod illud quod in
245 prima vice comprehendidit est vera forma eius. Forma autem

220 venit: pervenit R/perveniet: pervenit P1 221 intentionis: iterationis ErL3; alter.
in iterationis C1EP3 (a. m. E)/anima: animam R/tempus alter. in ipse a. m. E/post tem-
pus add. considerationis C1/pertransierit: transierit P3 222 prolongaverit: intra
multum tempus R/post forte scr. et del. de L3/tradetur (223): detrahetur C1 223 ab
anima om. C1R/anima om. L3/aut corr. ex ab L3 224 illa corr. ex alia ErL3
225 post in scr. et del. ali C1/post anima¹ add. et renovabit C1L3/rememorabit:
rememorabitur P1; corr. ex rememorabis S 226 per: et Er 227 eventus illius corr.
ex illius eventus P3/erit om. R 228 rememorans: meminerit R; corr. ex remorans P3
230 in¹ om. R 231 aut . . . animam inter. L3/forte corr. ex forme Er 232 que sunt
rep. P1 233 post comprehendet add. tantum R 234 ea: anima L3; corr. ex anima
C1/anima om. P1 235 comprehendidit: comprehendit EErP1P3RS 236 forma
iterabitur transp. EP3R 237 non prius transp. R/prius apparebat transp. C1L3/
apparebat: apparebit L3 239 post erit add. forma C1/magis fixa² om. EP3R/fixa²
om. P1 240 vere corr. ex vera L3/vere non transp. R/non om. P1/comprehendit:
comprehendit EP1 241 et . . . ea (242) mg. a. m. E/cum: in P3/comprehenderit:
comprehendiderit E/ex forma (242) om. P1 242 post intentiones add. que sunt in ea
ex forma P1 (scr. et del. que . . . ea) 243 eventus: perventus R/post et add. cum
C1EErL3P3/comprehenderit: comprehendiderit ER/in ipsa (244): inde ipsam EErL3P3
244 ipsa: ipsam C1; ea P1R/secundo: secundam EP3L3/intentionem: intentiones R/
ante in scr. et del. est E 245 comprehendidit: comprehendit EErL3P1P3RS; alter. in
comprehendit deinde corr. ex comprehendidit a. m. C1/eius: illius EP3R

vera verificata et certificata est magis fixa in anima et ymagi-
natione quam forma non certificata. Forma ergo rei vise, quan-
do multotiens iterabitur comprehensio eius, erit magis certifi-
cata apud animam et in ymaginatione. Et per fixationem forme
250 in anima et in ymaginatione erit memoratio illarum ab anima.

[4.15] Et significatio super hoc manifesta quod intentiones
et forme quando iterabuntur in anima erunt magis fixe quam
intentiones et forme non iterate est quia, quando homo voluerit
corde tenere aliquem sermonem vel versum aliquem, iterabit
255 sermonem illius intentionis multotiens, et sic figentur in sua
anima. Et quanto magis iterabit lectionem eius tanto magis erit
fixa in anima et remotioris oblivionis. Et si semel legerit ip-
sam, non remanebit versus ille fixus in anima. Et similiter si
bis legerit versum in anima forte non figetur in anima eius, et si
260 figatur, statim tradetur oblivioni. Et ex experimentatione ergo
istius intentionis patet quod forme venientes ad animam,
quanto magis iterabuntur tanto magis erunt fixa in anima et in
ymaginatione.

[4.16] Perventus autem formarum universalium modorum
265 visibilium in anima et figuratio earum in ymaginatione est quia
quilibet modorum visibilium, sicut forma et figura, sunt in
quibus equabuntur omnia individua illiusmodi, et illa indivi-
dua diversantur intentionibus particularibus comprehensis per
sensus visus. Et forte erit color in omnibus individuis illius-
270 modi unus; et forma, et figura, et color, et omnes intentiones ex
quibus componitur forma cuiuslibet individuorum speciei est
forma universalis illiusmodi. Et visus comprehendit illam for-
mam et illam figuram et comprehendit omnem intentionem in

246 verificata et certificata: certificata et verificata P3/post et² add. in EL3 247 ergo:
igitur P1 249 in inter. S/et² . . . ymaginatione (250) mg. a. m. C1 250 anima¹:
ymaginatione P1/anima et in om. S/post et add. per fixationem forme P1R/in om. C1/ab
anima: ad ipsa C1 251 post manifesta add. est EP3 (a. m. E) 252 fixe corr. ex
fixa L3 253 est om. EL3P3; mg. a. m. C1 254 vel . . . sermonem (255) om. Er/
versum aliquem transp. P3 255 figentur: figetur C1EP3R 256 quanto: quando
S/lectionem eius transp. C1L3 257 remotioris corr. ex remotionis L3/ipsam (258):
ipsum C1Er 258 ante non add. vel ipsum scilicet versum EP3R/post non scr. et del.
figetur P1 259 bis om. C1EErL3P3S/versum: ipsum EP3R/post versum add. antea
vel EP3/in anima¹ om. P1R/anima¹ alter. in antea C1/forte inter. P1 260 post figatur
scr. et del. et si figatur P1/tradetur: tradatur EP3/et om. C1EL3P3R/ex om. C1EP1P3R;
scr. et del. L3/ergo: igitur S/post ergo add. hac vel EP3 262 ante tanto add. ad
animam E/fixa: fixe EP3R 264 autem inter. a. m. Er 265 anima: animam Er/
earum: eorum R/ymaginatione corr. ex ymaginatio a. m. E 266 quilibet: quidlibet
C1; quodlibet ErP1RS/modorum: individuorum R/sicut . . . figura: habet formam et
figuram R/sunt om. C1EErL3P3R/post in add. anima P1 268 post diversantur add.
tantum R 269 sensum corr. ex ipsum P1 270 unus: unius C1/post ex scr. et del.
in P3 271 individuorum: individui R 273 ante illam add. universalem EP3R
(inter. a. m. E)

qua equabuntur individua speciei in omnibus individuis que
 275 comprehenduntur ex individuis illius speciei. Et comprehen-
 duntur ex individuis illius speciei etiam intentiones particu-
 lares per quas diversantur illa individua. Per intentionem ergo
 comprehensionis individuorum uniusmodi a visu iterabitur for-
 ma universalis que est in illa specie cum diversitate formarum
 280 particularium illorum individuorum. Et cum forma universalis
 iterabitur in anima, figetur in anima et quiescet, et ex diversita-
 te formarum particularium venientium cum formis universali-
 bus apud intuitionem comprehendit anima quod forma in qua
 equabuntur omnia individua illiusmodi est forma universalis
 285 illiusmodi. Secundum ergo hunc modum erit proventus forma-
 rum universalium quas visus comprehendit ex modis visibilium
 in anima et in ymaginatione.

[4.17] Forme ergo individuorum visibilium et forme modor-
 um visibilium quas visus comprehendit remanent in anima et
 290 figurantur in ymaginatione, et quanto magis iterabitur compre-
 hensio earum a visu tanto magis erunt fixa in anima et in
 ymaginatione. Et sustentatio sentientis in comprehensione
 quiditatis visibilium non est nisi super formas pervenientes in
 animam, quoniam comprehensio quiditatis visibilium non erit
 295 nisi per cognitionem. Et cognitio non est nisi ex comparatione
 forme quam visus comprehendit modo ad formam secundam
 que est in ymaginatione ex formis visibilium quas visus com-
 prehendit ante, et ex comprehensione considerationis forme
 comprehense modo ad aliam formarum pervenientium in
 300 ymaginatione. Comprehensio ergo quiditatis rei vise non est
 nisi ex comprehensione assimilationis forme rei vise alicui

274 *post* equabuntur *add.* omnia EP3R 275 *ante* ex *scr.* et *del.* illius spe P1/*post*
 individuis *add.* omnibus C1EL3P3R/comprehenduntur (276) . . . speciei (276) *om.* P3
 276 ex . . . speciei *om.* C1EErL3P1R/*post* etiam *scr.* et *del.* omnes L3; *scr.* et *del.* co P1/
 intentiones *corr.* ex intentionibus L3 277 intentionem: intentionem vel per intuitionem
 C1 (*scr.* et *del.* intentionem vel per) 278 *post* individuorum *add.* omnium EP3R/
 iterabitur: iteratur C1EErL3P3R 279 *post* est *add.* manifesta C1/diversitate: consideret
 diversitatem C1 280 *post* universalis *scr.* et *del.* et L3 281 figetur in anima
om. C1Er 282 particularium: universalium EP3/*ante* cum *add.* ad visum R/*post*
 formis *scr.* et *del.* et L3 283 *post* apud *add.* illam P1/intuitionem: intentionem
 C1ErL3P1S/*post* intuitionem *add.* vel intentionem illam EP3 (intentionem *corr.* ex
 intuitionem E)/comprehendit: comprehendet ER/qua: equa P1 284 est . . . illiusmodi
 (285) *inter.* L3 285 ergo hunc *transp.* P3/hunc *mg.* P3/*post* modum *scr.* et *del.* erit L3/
 proventus: perventus EEerP3R 286 visibilium: universalium P1 288 et . . .
 visibilium (289) *om.* R 289 visus *inter.* a. m. Er/visus comprehendit *transp.* C1/
 remanent *om.* S 291 fixa: fixe P3; *corr.* ex fixe a. m. E 293 super *corr.* ex per L3
 295 comparatione: comprehensione P1 296 forme *om.* EEerL3P3; *mg.* a. m. C1
 299 comprehense *alter.* ex comprehensione in comprehensioni L3/aliam: aliquam
 C1ErL3/formarum *corr.* ex formam L3P3

formarum quiescentium in anima fixarum in ymaginatione. Sustentatio ergo sentientis in comprehensione quiditatum visibilium non est nisi super formam universalem pervenientem in
 5 animam modorum visibilium, et sustentatio eius in cognitione individuorum visibilium non est nisi super formas individuorum pervenientes in animam cuiuslibet individuorum que visus comprehendit ante, et fuerint forme eorum ymagine ante et intellectu. Et virtus distinctiva naturaliter assimilatur formas
 10 visibilium apud visionem formis fixis in ymaginatione quas anima acquirit ex formis visibilium. Cum ergo visus comprehenderit aliquam rem visam, statim virtus distinctiva querit eius simile in formis existentibus in ymaginatione, et cum invenerit in ymaginatione aliquam similem forme illius rei vise,
 15 cognoscet illam rem visam et comprehendet quiditatem eius. Et si non invenerit ex formis existentibus in ymaginatione formam similem forme illius rei vise, non cognoscet illam rem visam nec comprehendet quiditatem eius. Et propter velocitatem assimilationis forme rei vise apud visionem a virtute distinctiva, forte accidet ei error ita quod assimilabit rem visam
 20 alii rei vise quando in re visa fuerit aliqua intentio que est in illa alia re. Deinde si consideraverit cum intuitionem illam rem visam post illam dispositionem et certificaverit formam eius, assimilabit ipsam forme simili illi in rei veritate, et manifestabitur illi secundo quod erraverat in prima assimilatione. Secundum ergo hunc modum comprehenduntur quiditates visibilium per sensum visus.

[4.18] Et cum omnes iste intentiones sint declarate, dicamus modo quod comprehensio visibilium per intuitionem erit
 30 duobus modis: comprehensio sola intuitionem et comprehensio per intuitionem cum scientia precedente. Comprehensio vero que est sola intuitionem est comprehensio visibilium extraneo-

3 quiditatum: quiditatis EP3R 5 modorum visibilium om. R 6 nisi inter. P3/
 super: secundum P1 8 comprehendit . . . ymagine om. E/fuerint . . . ymagine:
 quorum formae sunt conceptae imaginatione R 10 apud . . . visibilium (11) mg.
 a. m. S/post visionem add. modo C1/post formis add. visis EP3R 11 ante cum scr. et
 del. c P3/comprehenderit (12): comprehendit P3 12 post statim add. visus EP3
 13 eius om. P1/simile corr. ex summe L3 15 cognoscet: cognoscit S 17 forme mg.
 a. m. E 19 assimilationis mg. a. m. E 20 accidet: accidit P3 21 alii: alicui S/
 quando corr. ex quoniam C1/fuerit: fuit P3 22 re om. ErL3S/cum intuitionem corr. ex
 cum iteratione a. m. E/intuitionem: intentione P1; iteratione P3R 23 illam: istam
 EP3R; aliam Er/post eius scr. et del. eius L3 24 simili corr. ex simile S/illi: ei
 C1EErL3P3R/rei corr. ex re a. m. P3 28 omnes om. P1S/sint: sunt C1EL3P3
 29 modo: ergo C1L3/comprehensio: comprehensiones P1/per corr. ex ipsum Er
 30 post modis add. scilicet C1/et: vel P3 (inter.)/comprehensio per intuitionem (31)
 om. P3 31 cum inter. a. m. E/vero om. P1S

rum que visus non vidit ante aut visibilibus que visus compre-
hendit ante sed non est rememoratus visionis illorum. Quo-
35 niam visus, quando comprehendit aliquam rem visam quam
ante non percepit videndo, nec rem visam huius speciei, et
voluerit aspiciens certificare formam huius rei vise, intuebitur
ipsam et considerabit per intuitionem omnes intentiones que
sunt in ea. Et comprehendet per intuitionem formam eius
40 veram, et cum ante non percepit illam rem visam nec aliquam
rem huius speciei, non cognoscet illam formam eius apud eius
comprehensionem. Et in talibus indigetur intuitionem ad ipsam
formam propriam. Erit ergo certificatio forme huiusmodi
visibilibus non nisi per solam intuitionem tantum. Et similiter,
45 quando visus comprehenderit aliquam rem visam quam ante
percepit et non est rememorans ipsius, non cognoscet formam
eius secundo apud intuitionem, sed erit comprehensio huius-
modi visibilibus per solam intuitionem.

[4.19] Comprehensio vero que est per intuitionem cum sci-
50 entia precedente est comprehensio omnium modorum visi-
bilibus que visus comprehendit ante aut de quorum specie
aliquod comprehendit visus ante et pervenerint forme speci-
erum et individuorum eorum in anima. Cum ergo visus com-
prehenderit aliquam rem visam quam ante comprehendit aut
55 cuius speciei aliquam rem prius comprehenderit, statim apud
aspectum illius rei vise comprehendet totam formam eius.
Deinde modica intuitionem comprehendet totam formam eius

33 non . . . visus *om.* P3 34 est rememoratus: meminit R/rememoratus: rememo-
rans EP3 35 comprehendit: comprehenderit C1EErL3P3R/aliquam *corr.* ex
quam C1L3 (*a. m.* C1) 36 non *inter.* L3/huius: huiusmodi C1EL3P3 37 huius:
huiusmodi EP1P3 38 *post* omnes *scr.* et *del.* virtutes vel C1/intentiones: vir-
tutes EErL3P1P3S 39 in ea *corr.* ex *inter* P1/formam *om.* EP3/*post* eius *scr.* et *del.*
formam S 40 non *inter.* L3/percepit: perceperit C1EL3P1P3R 41 *post* rem *add.*
visam C1L3/huius: huiusmodi C1EP3/illam *om.* C1EErL3P3R 42 indiget: indiget
R/*corr.* ex *ing* P3/*post* indiget *add.* visus R/ipsam *om.* R 43 huiusmodi: huius C1
44 nisi *inter.* L3 45 visam *rep.* P1/*post* ante *add.* comprehendit vel E; *add.*
comprehendit vel P3 46 percepit: perceperit P1/est rememorans: meminit R/
formam: forma EP3 47 secundo: nisi R/*post* secundo *add.* ab ipso visu EP3/apud:
per EP3R/sed: ergo C1EErL3P3R/sed erit *transp.* C1EErL3P3/comprehensio *corr.* ex
comprehensionem S 49 comprehensio *corr.* ex comprehensi L3 50 modorum
om. R 51 aut: et P3; *corr.* ex et *a. m.* E/de *om.* EErL3P3; *inter.* *a. m.* C1/specie: speci-
ei EErP3; *corr.* ex speciei C1; *alter.* in speciei L3 52 aliquod: aliquid C1P1RS/
comprehendit: comprehendit EErP1P3R/pervenerint: pervenerunt R 53 ante et
add. eorum EP3R/et *om.* L3/anima: animam R/comprehenderit (54): compre-
hendit C1L3R 54 comprehendit: comprehendit EErL3P1P3R 55 cuius:
eius E; *om.* S/prius: ante EP3R/comprehenderit: comprehendit EL3P3R/*ante* statim
scr. et *del.* aut cuius speciei aliquam rem prius comprehendit L3/statim *corr.* ex antea
a. m. C1/apud aspectum (56) *om.* P1 56 comprehendet: comprehendit C1
57 deinde . . . eius *om.* S; *mg.* *a. m.* E; *rep.* Er

que est forma universalis sive speciei. Cum ergo ante compre-
hendidit visibilia illiusmodi rei vise, et pervenerit forma speciei
60 illius rei vise in sua anima, et fuerit rememorans ex forma uni-
versali illiusmodi rei vise, cognoscet formam universalem quam
comprehendit in illa re visa apud comprehensionem eius et
apud cognitionem forme universalis quam comprehendit in illa
re visa, et statim cognoscet illam rem visam specialiter. Dein-
65 de quando intuerit intentiones residuas que sunt in illa re visa,
certificabit formam eius particularem. Si autem non percepit
ante illam rem visam aut forte percepit illam sed non meminit
de perceptione illius, non cognoscet formam particularem. Et
cum non cognoverit particularem, non cognoscet illam rem vi-
70 sam, et sic erit cognitio illius rei vise ab eo secundum speciem
tantum. Et acquirit ex intuitione et certificatione forme eius
formam eius particularem que appropriatur suo individuo. Et
si ante percepit illam rem visam, et non percepit alia individua
huiusmodi speciei, et fuerit rememorans illius et forme quam
75 ante comprehendidit ex illa re visa, quando comprehenderit
formam eius particularem, cognoscet apud cognitionem for-
mam particularem. Et apud cognitionem forme particularis
comprehendet rem visam, et sic per comprehensionem forme
eius particularis certificabit formam rei vise, et cum hoc cog-
80 noscet ipsam rem visam. Et erit cognitio illius rei vise ab eo sic
specialiter et secundum individuum in simul. Et si ante per-
ceperit illam rem visam, sed non perceperit ex modo illius rei
vise nisi individuum tantum, et non distinguitur ab eo forma
universalis illiusmodi rei vise, quando comprehenderit illam
85 rem visam et comprehendit intentiones universales que sunt in

58 forma universalis *transp.* R/sive: vel P1; sue S; *mg.* a. m. C1; *om.* R/ante *corr.* ex autem a. m. C1/comprehendidit (59): comprehendit L3P1P3R; *corr.* ex comprehendit a. m. C1 59 et ... vise (61) *mg.* a. m. E/speciei *om.* P1; *mg.* P3 60 rememorans: memor R/universali (61) *corr.* ex universalis C1; *corr.* ex universa a. m. S 63 ante forme *scr.* et *del.* eius P3 64 re *inter.* L3/et *om.* C1EErL3P3R 65 intuerit: intuitus fuerit R 66 si ... non *alter.* in sive non L3 67 ante *inter.* L3/rem *inter.* a. m. Er/rem ... illam *om.* L3/forte *om.* C1 69 cognoverit: cognovit EP3/post cognoverit *add.* formam C1L3R 71 acquirit: acquirit C1EErL3P3R/intuitione: intentione Er; *corr.* ex cognitione a. m. C1/forme eius *transp.* P1/eius *om.* S/post eius *scr.* et *del.* et L3; *scr.* et *del.* particula P1 73 percepit¹: perceperit P1R/percepit²: perceperit R 74 huiusmodi: huius C1E/rememorans: memor R/et² *om.* R/et forme *corr.* ex forme et S 75 comprehendidit: comprehendit P1P3R/re *corr.* ex rei P3/comprehenderit: comprehendit C1 76 cognoscet ... particularem (77) *inter.* L3/apud: per P3R; *corr.* ex per a. m. E/formam (77) *om.* EP3 78 per *om.* P1 79 post particularis *scr.* et *del.* comprehendet rem visam P1/cum hoc: simul R 80 ipsam: illam C1; *om.* Er/illius *om.* C1EL3P3R/sic *om.* P1 81 in *om.* R/et² ... perceperit¹ (82) *rep.* P1/perceperit¹ (82): percepit EL3P3 82 perceperit²: percepit L3P3S 83 post nisi *add.* illum C1EErL3P3; *add.* illud R/distinguitur: distinguatur R; *corr.* ex distinguuntur P1/eo: ea P1 85 comprehendit: comprehenderit C1EErL3P3R

illa re visa et in omnibus rebus illius speciei, non cognoscet
 illam rem visam nec comprehendet quiditatem eius ex compre-
 hensione forme universalis. Cum ergo comprehenderit inten-
 90 tiones residuas que sunt in illa re visa, et comprehenderit for-
 mam particularem eius, et fuerit rememorans forme particu-
 laris quam comprehendit in illa re visa, cognoscet formam par-
 ticularem apud comprehensionem eius. Et cum cognoverit for-
 mam particularem, cognoscet eandem rem visam ipsam, et erit
 95 cognitio illius rei vise ab eo individualiter. Et nulla res visa
 comprehenditur per intuitionem nisi secundum aliquem isto-
 rum modorum. Comprehensio ergo omnium visibilium secun-
 dum intuitionem erit duobus modis: sola intuitionem et com-
 prehensio per intuitionem cum scientia antecedente. Cognitio
 autem talis et scientia quandoque erit secundum speciem tan-
 100 tum, quandoque secundum speciem et individuum in simul.

[4.20] Et etiam comprehensio per intuitionem non erit nisi
 in tempore. Quoniam intuitio non erit nisi per intuitionem et
 motum visus, sed distinctio et motus non erit nisi in tempore.
 Intuitio ergo non erit nisi in tempore. Et superius declaratum
 105 est etiam quod comprehensio per cognitionem et comprehensio
 per distinctionem non erit nisi in tempore. Et cum declaratum
 est quod comprehensio visibilium per intuitionem quandoque
 erit sola intuitionem et quandoque per intuitionem cum cogni-
 tione precedenti, et quod illud quod comprehenditur per intu-
 110 itionem et quod comprehenditur per cognitionem non compre-
 henditur nisi in tempore, dicemus quod comprehensio que erit
 per intuitionem cum cognitione precedenti erit in maiori parte

86 illa: ea C1L3/cognoscet: cognoscit EP3; cognovit L3 88 cum corr. ex co P3
 89 comprehenderit: comprehendit P3 90 rememorans: memor R 91 com-
 prehendit: comprehendit C1EErP3 93 visam ipsam *transp.* P1/ipsam *om.* EP3R
 95 comprehenditur: comprehendetur R 96 ergo omnium *corr.* ex omnium *ergo* Er
 97 comprehensio (98): comprehensio C1EErL3P1R; prehensione P3 98 ante-
 cedente: precedente EP3R/*post* antecedente *add.* illam P1S 99 et *om.* P3; *corr.* ex erit
 E/*post* scientia *inter.* talis L3; *inter.* est a. m. S 100 ante quandoque *scr.* et *del.*
 individuum simul C1/*et om.* L3/*in om.* EErL3P3R 102 intuitionem: distinctionem
 C1EP3R; *alter.* in distinctionem L3S (a. m. S) 103 *post* distinctio *add.* non erit nisi in
 tempore C1ErL3/*et . . .* tempore (104) *mg.* a. m. C1/*et* motus *om.* S/*erit:* erunt EP3R
 104 intuitio . . . tempore *om.* S; *mg.* P1/*et mg.* P1 105 etiam *om.* EL3P1P3R
 106 *post* per *scr.* et *del.* cognition E/*erit:* est ER/*cum:* quia R 107 per *corr.* ex ad P3/
 quandoque *om.* C1ErL3/quandoque erit (108) *transp.* EP3R 108 intuitionem: inten-
 tione P1; *corr.* ex intuitionem Er/*post* intuitionem *add.* quandoque C1; *scr.* et *del.* et
 quandoque per intuitionem erit sola intuitionem L3/quandoque: quando E; *corr.* ex quando
 a. m. P3/*cum:* in P3 109 precedenti: precedente C1EL3P3R/*et . . .* precedenti (112)
om. P1 110 ante et *scr.* et *del.* et quod comprehenditur per intuitionem S 111 ante
 nisi *scr.* et *del.* nisi P3/*post* dicemus *add.* ergo C1 112 ante cum *add.* vel EP3/*post*
 cognitionem *add.* vel scientia R/*precedenti:* precedente C1EP3R/*post* precedenti *add.*
 scientia precedente EP3/*maiori corr.* ex maiore P3

in minori tempore quam sit tempus in quo erit comprehensio
per solam intuitionem. Quoniam intentiones existentes in ani-
115 ma et presentes memorie non indigent ut cognoscantur omnes
intentiones que sunt in eis ex quibus componuntur in rei veri-
tate; sed sufficit in comprehensione earum comprehensio ali-
cuius intentionis proprie illis. Cum ergo virtus distinctiva
comprehendit in forma veniente ad ipsam aliquam intentionem
120 propriam illi forme et fuerit rememorans prime forme, cognos-
cet omnes formas venientes ad ipsam, quoniam omnis intentio
que appropriatur alicui forme est signum significans super illas
formas.

[4.21] Verbi gratia, quia, quando visus comprehenderit
125 individuum hominis et comprehenderit lineationem sue manus
tantum, statim comprehendet quod sit homo antequam com-
prehendat lineationem sue faciei, et antequam comprehendat
lineationem partium residuarum eius; et similiter si compre-
henderit lineationem faciei eius antequam comprehendat par-
130 tes residuas eius. Ex comprehensione ergo quarundam inten-
tionum que appropriantur forme hominis comprehendet quod
illud visibile sit homo sine indigentia comprehensionis partium
residuarum. Quoniam comprehendet partes residuas per cog-
nitionem precedentem ex formis residentibus in anima, formis
135 dico hominum. Et similiter, quando visus comprehenderit ali-
quas intentiones que appropriantur forme particulari alicuius
individui quod ante visus percepit, sicut similitatem in naso,
aut viriditatem in oculo, aut arcualitatem in superciliis, com-
prehendet cum comprehensione totius sue forme illud indivi-
140 duum, et cognoscet ipsum. Et similiter cognoscet equum per

113 in¹: et Er/erit: erat C1ErL3 114 intentiones: intuitiones ErL3P1S; cognitiones P3; formae R; alter. ex cognitiones in intuitiones a. m. E 115 ut: quod EP3
116 intentiones corr. ex intuitiones L3 117 earum: eorum C1EL3P3 118 post
intentionis scr. et del. in comprehensione earum E 119 comprehendit: comprehen-
derit EEerL3P1R 120 rememorans: memorans C1EL3P3; memor R/forme²:
figure P1 121 formas om. P1 124 quia om. C1/quando om. P1/comprehenderit:
comprehendit EP3 125 ante et scr. et del. et comprehenderit L3/lineationem om. Er/
sue: sive P1 126 comprehendet: comprehendit C1L3/antequam . . . et (127) om. Er/
comprehendat (127): comprehendet S 127 sue . . . lineationem (128) inter. L3/sue
facie transp. EP3R/antequam: tamen non P1; corr. ex tamen non a. m. S/comprehendat:
comprehendet C1; comprehendit P1S 128 post eius scr. et del. et similiter si
comprehenderit lineationem partium residuorum eius S/comprehenderit (129):
comprehendit Er 129 eius: suae R/comprehendat: comprehendit S 130 resi-
duas eius transp. P3/ex comprehensione: et comprehensio P3 131 que inter. L3/
comprehendet: comprehendit C1EErL3R 132 comprehensionis corr. ex
comprehensione Er 134 residentibus: resistantibus ErP1S 135 quando: cum
EP3/aliquas (136): quasdam C1ErL3 137 individui corr. ex residui E/post visus add.
non P1 138 oculo corr. ex oleo EP3 (a. m. E)/comprehendet (139) rep. P3
139 cum om. EP3/sue forme transp. Er 140 ipsum: ipsam P1S/equum: eum S

aliquam maculam in fronte eius aut per diversitatem coloris. Et similiter scriptor, quando comprehenderit formam alicuius dictionis superficialiter, cognoscet eam antequam consideret litteras particulares, et similiter omnes partes quas scriptor
 145 frequenter et continue videt cognoscuntur ab eo apud comprehensionem ex comprehensione quarumdam litterarum.

[4.22] Visibilia ergo que visus ante comprehendit, et cognoscit modo formas illorum, et est rememorans illorum comprehenduntur a visu per signa. Visibilia autem extranea que
 150 visus ante non percepit aut visibilia que ante percepit sed tamen non est rememorans illorum non sunt ita. Quoniam, quando visus comprehenderit aliquam rem visam quam ante non vidit et comprehenderit lineationem quarumdam partium, non comprehendet ex eo quiditatem illius rei vise, quoniam non
 155 est apud ipsum forma quiescens partium residuarum. Visus ergo non comprehendit certitudinem rei vise quam ante non vidit nisi per considerationem omnium suarum partium et omnium intentionum que sunt in ea. Et similiter forma rei vise quam visus ante percepit sed non rememoratur non certificatur
 160 ab eo nisi post considerationem omnium intentionum que sunt in ea. Sed comprehensio quarumdam intentionum que sunt in forma erit in minori tempore illo in quo comprehendit comprehensionem omnium intentionum que sunt in forma. Visio ergo que est per intuitionem cum cognitione precedenti erit in maiori
 165 parte in breviori tempore tempore in quo erit visio sola intuitione, et propter hoc visus comprehendit visibilia assueta comprehensione valde veloci in tempore latente sensum; et non erit inter oppositionem visus ad rem visam et inter comprehensio-

141 *post coloris add. eius P1* 142 *et om. P1S/comprehenderit: comprehendit C1*
 143 *dictionis: distinctionis Er* 145 *cognoscuntur: cognoscantur C1ErL3; cognoscentur EP3/apud comprehensionem (146) om. R* 147 *ante comprehendit transp. P1/comprehendit: comprehenderit EP3R/cognoscit modo (148) transp. C1EErL3P3R*
 148 *rememorans: memor R/comprehenduntur (149): comprehenditur Er* 149 *post autem add. ante S* 151 *tamen om. C1EErL3P3R/rememorans: memor R* 154 *non est (155) om. R* 155 *ipsum: ipsam EErL3P3/post ipsum add. non R/forma quiescens transp. EP3R/quiescens: quiescit R* 157 *post per scr. et del. refle P1/considerationem: consuetudinem ErP3; corr. ex consuetudinem C1L3 (a. m. C1); alter. ex consuetudinem in distinctionem a. m. E/omnium om. S/post partium add. adinvicem P1* 159 *post visus scr. et del. quando L3/percepit: percipit ErP3; perceperit S/rememoratur: meminit R; corr. ex remoratur P3* 162 *tempore: parte P3; corr. ex parte a. m. E/illo om. EErL3P3; mg. a. m. C1/comprehensionem (163) om. C1EErL3P3R* 163 *omnium intentionum: omnes intentiones C1EErL3P3R/sunt: sun S* 164 *est inter. C1L3 (a. m. C1)/post est scr. et del. in intuitionem P3/precedenti: precedente C1R/in inter. a. m. C1*
 165 *post tempore' add. illo R/tempore' om. L3; mg. a. m. C1/post tempore add. secundo scilicet C1/erit: erat C1EL3P3/intuitionem (166): intentionem ErP1; corr. ex intuio P3*
 166 *comprehendit corr. ex comprehendet Er/assueta: consueta EP3R* 168 *oppositionem: oppositum P1S*

170 nem quiditatis rei vise assuete tempus sensibile in maiori parte. Quoniam homo ex pueritia et ex principio crementi comprehendit visibilia, et iterantur super eius aspectum individua visibilium et forme universales modorum visibilium. Et etiam declaraturn est quod forme visibilium quas visus comprehendit perveniunt in anima et figurantur in ymaginatione, et quod forme que iterantur visui figurantur in anima, et quiescit figuratio earum in ymaginatione. Omnia ergo visibilia assueta et omnes modi assueti sunt existentes in anima, et quiescentes figurati in ymaginatione, et presentes memorie. Cum ergo visus comprehenderit aliquam rem visam assuetam, et comprehenderit totam suam formam, et post illud comprehenderit aliquod signum proprium illi rei vise, comprehendet quiditatem illius rei vise apud comprehensionem illius signi, et erit comprehensio rei vise ab eo per comprehensionem precedentem et per modicam intuitionem. Visibilia ergo assueta comprehenduntur a visu per signa et per cognitionem precedentem, quare ergo erit comprehensio quiditatum eorum in maiori parte in tempore insensibili.

[4.23] Et etiam quod comprehensio speciei rei vise est in minore tempore quam comprehenditur individuitas rei vise est quoniam, quando visus comprehenderit aliquod individuum hominum, comprehendit ipsum esse hominem antequam com-

169 rei vise *transp.* P1/sensibile *corr.* ex subtile a. m. L3 170 ex²: a P1/principio *corr.* ex tempore EP3 (a. m. E)/crementi: incrementi R 172 visibilium¹: visibilia C1L3/modorum om. R/etiam om. P1S 173 post est *add.* etiam P1/post comprehendit *add.* quidem C1L3 174 anima: animam R/post anima *scr.* et *del.* et quiescit figuratio earum in ymaginatione et quod forme que iterantur visui figurantur in anima E/forme . . . iterantur (175): que . . . forme P1S 175 visui: in sui Er/post anima *add.* et quas visus comprehendit perveniunt in anima EL3P1P3R (anima: animam R); *scr.* et *del.* et quas visus comprehendit perveniunt in anima et figurantur in ymaginatione et quod forme que iterantur visui figurantur in anima C1/figuratio: significatio Er 176 in ymaginatione *corr.* ex in anima P3 177 sunt existentes: existunt R/quiescentes: quiescunt R/figurati: in figura et C1EErL3P3 (*alter.* ex figura in figurazione a. m. C1) 179 visam *inter.* a. m. E/et *inter.* a. m. C1/comprehenderit²: comprehendit L3/totam suam (180) *transp.* C1 180 suam formam *transp.* EP3R/illud: illic EP3 181 illi: illius EP3R/illius om. C1EErL3P3R 182 signi om. EP3/erit *corr.* ex exit a. m. E 183 ante rei *add.* illius P1/comprehensionem: cognitionem R/precedentem om. P1/per² om. R 184 intuitionem *corr.* ex intentionem a. m. E 185 ergo om. R 187 insensibili: sensibili P1 188 quod: quia EP3; om. R/speciei . . . vise: vise rei speciei Er/post vise *add.* in minori parte P1/est om. S/post est *add.* in maiori parte EP3R/post in *add.* minori parte est in P1 189 minori: maiori P1S/tempore: parte ErL3P1/comprehenditur: comprehendatur EL3R; *alter.* ex comprehendatur in comprehendatur P3/individuitas *corr.* ex individua P3/post vise *add.* et EP1P3R 190 post quoniam *scr.* et *del.* non C1/quando visus *mg.* a. m. C1/visus om. EL3P3/comprehenderit: comprehendit C1 191 post hominum *add.* primo EP3R/comprehendit: comprehendet C1ErL3R/antequam *corr.* ex quam E/antequam . . . hominem (193) *inter.* a. m. S/comprehendit (192): comprehendat EEerP3R

prehendet formam eius particularem. Et forte comprehendet
 ipsum esse hominem, quamvis non comprehendat lineationem
 faciei; sed ex erectione sui corporis et ordinatione membrorum
 195 corporis eius comprehendet ipsum esse hominem, quamvis non
 viderit faciem eius. Et similiter visus forte comprehendit
 quandoque specialitatem alicuius modorum visibilium assue-
 torum per quedam signa que appropriantur illi speciei. Et non
 est sic comprehensio individualitatis rei vise, quoniam indivi-
 200 dualitas rei vise non comprehendetur nisi ex comprehensione
 intentionum particularium que appropriantur illi individuo aut
 ex comprehensione quarumdam. Sed comprehensio quarum-
 dam intentionum particularium que appropriantur individuo
 non comprehenduntur nisi post comprehensionem intentionum
 205 universalium que sunt in illo individuo aut post comprehensio-
 nem quarumdam. Aut generaliter intentiones que sunt in for-
 mis universalibus modi illius individui sunt quedam intentio-
 nes que sunt in forma eius individuali, sed comprehensio par-
 tis est in minori tempore quam tempus in quo comprehenditur
 210 totum. Comprehensio ergo specialitatis rei vise a visu est in
 minori tempore quam tempus in quo comprehenditur indivi-
 dualitas illius rei vise.

[4.24] Et etiam comprehensionis specialitatis tempus visi-
 bilium (scilicet assuetorum) diversitatur, quoniam quedam
 215 specierum visibilium assuetorum assimilantur aliis speciebus
 et quedam non, ut species hominis et species equi, quoniam
 forme speciei hominis non assimilantur alii speciei animalium.
 Et non est ita equus, quoniam equus assimilatur multis ani-
 malibus in tota forma. Tempus ergo in quo visus comprehen-
 220 dit speciem individui hominis et comprehendit ipsum esse
 hominem non est sicut tempus in quo comprehendit speciem

193 ipsum: ipsam P3/hominem *mg. a. m. E/quamvis corr. ex quoniam L3/non inter. P3*
 194 erectione *corr. ex erectionem P3/sui om. P1* 195 corporis: corporum P1
 196 comprehendit: comprehendet EP1P3R 197 alicuius modorum *transp. EP3R/*
visibilium om. P1S 199 individualitatis: individuitatis C1EL3P3R/quoniam *om.*
EP3R/individualitas (200): individuitas C1L3; corr. ex individualitatis S 200 ante rei
add. enim EP3R/comprehendetur: comprehenditur R 202 sed . . . quarumdam
 (203) *mg. a. m. E/comprehensio: comprehensiones P1* 205 post *inter. L3*
 207 modi illius *transp. L3P1R/post individui add. aut S; scr. et del. autem C1/quedam:*
ante EEerL3P1P3R; mg. a. m. C1 209 minori: maiori EP3/post tempore *scr. et del. in*
S/quam: quoniam P1 210 comprehensio *rep. E; corr. ex comprehenditur to P1*
 211 post quam *scr. et del. temporis P1/individualitas (212) corr. ex individualitatis P3*
 213 post etiam *add. tempus EP3R/tempus om. EP3R* 216 quedam *om. Er; inter. EL3*
 (a. m. E)/ut *om. Er; inter. EL3* 217 forme: forma EP3R/assimulantur: assimu-
 latur EP3 218 est *om. C1ErL3S/post ita scr. et del. ita P1/equus¹: in equis EP3R/*
equus² om. P1/post equus² add. aliquis R 220 post et *scr. et del. non C1/esse inter. L3*

equi et comprehendit ipsum esse equum, et maxime quando
comprehenderit utrumque in remotione alicuius quantitatis.
Quoniam, quando visus comprehenderit individuum alicuius
225 hominis motum localiter, statim comprehendet ipsum esse ani-
mal ex motu, et ex erectione corporis comprehendet ipsum
esse hominem. Et non est ita quando comprehenderit equum,
quoniam, quando visus comprehenderit individuum equi mo-
vens se et comprehenderit cum hoc motum eius et numerum
230 pedum, non comprehendet ex hoc ipsum esse equum, quoniam
iste intentiones sunt in pluribus quadrupedum que assimulan-
tur equo in pluribus intentionibus, et maxime in mulo, quoniam
mulus assimilatur equo in multis dispositionibus. Quoniam
mulus non distinguitur ab equo nisi per intentiones fere non
235 manifestas, sicut lineationem faciei, et extensionem colli, et
velocitatem motus, et amplitudinem passuum. Si autem visus
non comprehenderit aliquam istarum intentionum per quas
comprehenditur equus cum comprehensione totius sue forme,
non comprehendet ipsum esse equum. Et tempus in quo visus
240 comprehendit erectionem corporis hominis non est sicut tem-
pus in quo comprehendit formam equi cum intentionibus par-
ticularibus per quas distinguitur equus ab alio. Comprehensio
igitur speciei hominis est in minori tempore quam tempus in
quo comprehenditur species equi. Quamvis enim duo tempora
245 sint parva, tamen unum eorum secundum omnes dispositiones
eius est maius altero.

[4.25] Et similiter, quando visus comprehenderit colorem
roseum in floribus cuiusdam orti, statim comprehendet quod
substantie illorum colorum sunt rose propter colorem proprium
250 rosarum, et cum hoc quod ille color est in rebus existentibus in
orto, ante comprehensionem rotunditatis, et ante rotunditatem

222 comprehendit: comprehendet C1EErL3P3 223 comprehenderit: comprehendit
P3R/remotione: rememorazione P3 224 comprehenderit: comprehendit P3/
alicuius hominis (225) *transp.* R 225 comprehendit: comprehendit P1S 226 *post*
animal *add.* et C1/ex² *om.* C1L3S/comprehendet: comprehendit C1 229 cum hoc:
simul R 230 *post* pedum *scr. et del.* eius P3 231 iste: illae R/quadrupedum:
quadrupedibus EP3R 232 et maxime: ut P1S 233 *post* equo *add.* et C1Er; *add.*
etiam L3 234 distinguitur: distinguit P3/intentiones *corr.* ex intuitiones a. m. C1
235 extensionem: extensione P3 236 et *corr.* ex ad C1 237 non *om.* EP3/istarum
intentionum *transp.* R 238 sue *om.* P1 239 visus *om.* EP3 243 igitur: ergo
R/est *mg. a. m.* C1/tempore *corr.* ex parte S/quam *om.* C1ErL3/tempus: tempore C1ErL3;
om. EP3 244 enim *om.* EErL3P3R; *mg. a. m.* C1 245 sint: sunt C1S 246 eius
om. C1EErL3P3R 247 comprehenderit: comprehendit EL3P3 249 substantie
... colorum: illorum ... substantie C1/colorum *om.* L3/rose: rosee C1Er; *corr.* ex rosee
L3/*post* colorem *add.* roseum C1 250 est *om.* Er/in rebus *rep.* Er 251 orto *corr.*
ex ordo P1/*post* orto *add.* comprehenditur R/*post* ante¹ *add.* comprehendit P1/ante²
om. C1EErL3P3

- foliorum eius et applicationem foliorum eius unius super alterum, et ante comprehensionem omnium intentionum eius ex quibus componitur forma rose. Et non est ita quando comprehenderit viriditatem mirti in orto. Quoniam, quando visus
 255 comprehenderit viriditatem mirti tantum in orto, non comprehendet ipsam esse mirtum ex comprehensione viriditatis tantum, quoniam plures plantarum sunt virides, et cum hoc plures plante assimilantur mirto in viriditate et in figura. Si ergo non
 260 comprehenderit figuram foliorum eius, et spissitudinem eorum, et intentionem propriam mirti, non comprehendet ipsam esse mirtum. Et tempus in quo visus comprehendit figuram foliorum mirti et intentiones secundum quas appropriatur mirtus cum comprehensione viriditatis non est sicut tempus in quo
 265 comprehendit colorem roseaceum tantum. Et similiter quiditates omnium specierum que possunt assimilari aliis non comprehenduntur a visu nisi per magnam intuitionem. Quiditas autem visibilium pauce assimilationis ad alia comprehenditur a visu pauca intuitionem. Et similiter de individuis,
 270 quoniam individuum quod non assimilatur alii individuo comprehenditur a visu per modicam intuitionem et per signa, et individuum quod visus cognoscit et assimilatur alii individuo quod visus cognoscit comprehenditur a visu per magnam intuitionem.
- 275 [4.26] Species ergo et individuum omnium visibilium assuetorum comprehenditur a visu per modicam intuitionem cum cognitione precedenti, et erit comprehensio eorum in maiori parte in tempore insensibili. Tamen diversatur tempus com-

252 et . . . eius *mg. a. m. C1/applicationem: applicatione Er; applicationum R; corr. ex applicationum P1* 254 est *om. EP3* 255 viriditatem . . . mirti (256) *mg. L3/mirti: mirte P1S/in . . . mirti (256) om. Er/quoniam . . . orto (256) mg. a. m. E* 256 comprehenderit: comprehendet *EP3/viriditatem mirti transp. C1/viriditatem . . . tantum: tantum . . . mirti EP3R/mirti: mirte P1S; alter. in mirte a. m. C1/tantum om. EP1/post orto add. quoniam (255) . . . orto (256) P1 (mirti: mirte)/comprehendit (257): comprehendit P1S* 257 mirtum: mirtam *C1L3P1S/ex mg. a. m. C1/viriditatis corr. ex miriditatis Er* 258 plantarum: plantae *R* 259 assimilantur *corr. ex dissimulantur E/mirto: mirte P1S/in¹ mg. a. m. C1/in² om. C1EL3P3R* 260 post figuram *scr. et del. fol P1/et . . . eorum om. C1L3* 261 mirti: mirte *ErL3P1S/post mirti add. et spissitudinem eorum C1L3/ipsam . . . mirtum (262): mirtum . . . esse S* 262 mirtum: mirtam *P1S/visus om. EP3R* 263 secundum: in *C1EErL3P3* 264 non est *om. P3* 265 colorem *om. P1/roseaceum: roseaceum EP3; roseum Er* 267 comprehenduntur: comprehenditur *Er/post nisi add. in P1* 268 visibilium *om. R/aliam altera P1S* 270 ante quoniam *add. similiter P3/post quod add. visu EP3R (inter. a. m. E); add. visu etiam C1ErL3/post non scr. et del. a P1* 271 et² *om. Er* 272 ante quod *scr. et del. et P1/et . . . cognoscit (273) om. Er/post et add. quod R; scr. et del. non E* 273 quod: quamvis *R/visus om. R/post cognoscit add. tamen R* 275 ergo: vero *L3P3; corr. ex vero a. m. C1* 276 modicam: modica *P1* 277 precedenti: precedente *C1L3R* 278 insensibili: sensibili *R*

prehensionis eorum secundum diversitatem specierum indi-
 280 viduorum eorum. Et erit comprehensio speciei velocior com-
 prehensione individui, et erit comprehensio speciei pauce
 assimulationis ad alia velocior comprehensione speciei multe
 assimulationis, et erit comprehensio individui pauce assimu-
 285 lationis ad alia velocior comprehensione individui multe as-
 simulationis.

[4.27] Similiter et tempus intuitionis diversatur secundum
 intentiones quas quisque intuetur in visibilibus. Verbi gratia,
 quia quando visus comprehenderit multiples animal parvorum
 pedum, et illud animal fuerit in motu, per modicam intuitio-
 290 nem comprehendet motum eius, et cum comprehenderit motum
 eius, comprehendet ipsum esse animal. Deinde per modicam
 intuitionem in pedibus comprehendet ipsum esse multiples ex
 comprehensione distantie inter pedes. Et cum hoc non cognos-
 cet statim numerum pedum, et si voluerit cognoscere numerum
 295 pedum, indigebit pluriori intuitionem et maiori tempore. Com-
 prehensio ergo animalitatis eius erit in tempore parvo. Deinde
 comprehensio multitudinis pedum erit in parvo tempore, et
 numerus pedum non comprehenditur nisi postquam fuerit
 visus intuens quemlibet pedum et numeraverit ipsos, quod non
 300 potest esse nisi in tempore alicuius quantitatis. Et erit quanti-
 tas temporis secundum multitudinem pedum et paucitatem
 eorum. Et similiter, quando visus comprehendit figuram ro-
 tundam intra quam est figura multorum laterum, et fuerint
 latera illius figure parva, et cum hoc fuerit diversorum laterum
 5 non maxima diversitate, apud comprehensionem totalis figure
 comprehendet ipsam esse rotundam. Et non comprehendet

279 *post specierum add. et L3P1R (inter. L3)* 280 *velocior . . . speciei (281) om. P3*
 281 *erit om. P1* 282 *post alia add. erit P1/speciei: superficiei P3/speciei . . .*
assimulationis (283) corr. ex assimulationis . . . multe Er 283 *erit: similiter EP3R/*
pauce . . . individui (284) om. Er; inter. L3 284 *ad alia: erit EP3R* 286 *similiter*
om. C1EErL3P3R/intuitionis: intentionis EP3 287 *quisque om. S* 288 *quia:*
quoniam S/multiples animal transp. EP3R/animal parvorum corr. ex parvorum ani-
mal Er 290 *comprehendet . . . eius (291) mg. a. m. E/post et scr. et del. con P3/*
comprehenderit: comprehendet C1EL3P3; comprehendit Er 293 *distantie alter. ex*
tantis in distantis a. m. S/cum hoc: sic R 294 *si om. Er* 295 *pluriori: pluri EP3;*
longiori R/intuitione: intentione Er; corr. ex intentione L3; alter. in intentione a. m. E/
maiori: maiore R 296 *ergo inter. E/tempore parvo transp. P1* 297 *multitudinis:*
multitudines L3; corr. ex multo Er/parvo tempore transp. EP3R/et: sed R 298 *com-*
prehenditur: comprehendetur EP3 299 *intuens: intuitus R* 1 *paucitatem corr.*
ex paucitem a. m. S 2 *comprehendit: comprehenderit C1EP3R* 3 *intra: in terra*
P1; inter P3/est: erit P3; corr. ex erit E 4 *et inter. a. m. E/fuerit om. C1/post laterum*
scr. et del. et (3) . . . laterum (4) L3 5 *maxima corr. ex maxime P3/apud corr. ex aliud*
P1/post figure scr. et del. et C1 6 *esse: rem C1*

statim quod intra illam sit laterata figura quando latera illius fuerint in fine parvitat^{is}, et cum intuerit figuram rotundam profundiori intuitione, apparebit ei figura laterata que est intra rotundum. Erit ergo comprehensio rotunditatis figure velocior comprehensione figure laterate que est intra. Deinde apud comprehensionem istius non apparebit diversitas laterum istius figure, nec distinguitur ab eo sive sint equalia sive non, et non apparebit inequalitas laterum figure laterate nisi post magnam intuitionem et in tempore alicuius quantitatis.

[4.28] Et etiam sentiens, quando voluerit intueri figuram totius rei vise, sufficit ei ut transeat visus super superficiem rei vise tantum. Et similiter, quando voluerit intueri colorem rei vise, sufficit ei transire visum super ipsum tantum—et similiter intueri asperitatem superfici^ei rei vise, aut planitiem, aut diafonitatem, aut spissitudinem. Et non sunt ita intentiones occulte et subtiles que sunt in visibilibus, sicut figure que sunt in quibuslibet partibus visibilium, et consimilitudo figurarum, et quantitatis partium, et diversitas quantitatum et colorum, et consimilitudo eorum, et ordinatio partium parvarum adinvicem, quoniam iste intentiones non comprehenduntur per intuitionem nisi postquam fuerit visus fixus super quamlibet partium, et consideraverit figuras illarum partium, et comparaverit unam ad alteram. Et hoc non complebitur in tempore parvo et per motum velocem sed in tempore alicuius quantitatis. Tempus igitur intuitionis intentionum visibilium diversatur secundum diversitatem intentionum intuitarum.

[4.29] Et cum declaratum sit hoc, dicamus quod visio que est per cognitionem precedentem, et per signa, et per modicam intuitionem non est comprehensio certificata. Quoniam comprehensio rei vise per cognitionem precedentem et per signa non est nisi circa totalitatem et universalitatem rei vise in gros-

7 intra: inter L3/illam: ipsam EP3R/quando: quoniam P3R; corr. ex quoniam a. m. E/post quando scr. et del. a latera illius S/illius: eius C1EL3P3 8 fuerint: fiunt C1L3; fuerunt R/intuerit: intuitus fuerit R/post intuerit scr. et del. comprehensio rotunditatis figure velocior comprehensione Er 9 profundiori: profundiore R/ei om. EP3R/intra: inter P3 10 rotundum: rotundam P3R/post rotundum add. figuram C1 11 figure laterate: figura laterata Er/laterate corr. ex latente L3 13 distinguitur... eo: distinguetur a visu R/sive^{1,2}: an R/sint: sunt C1 14 inequalitas: equalitas Er/post: per C1ErL3; alter. in per a. m. E 15 et om. P1S 16 sentiens quando transp. ErS 19 ipsum: eum P1/post similiter add. quando voluerit R/rei vise om. P1S 22 et om. EP3R 24 quantitatis: quantitas P1; alter. in quantitas C1/quantitatum corr. ex quantitatis P3/et¹ om. P3 25 adinvicem (26): inter se R 26 quoniam corr. ex quando a. m. C1 27 super: supra EL3P3 29 hoc om. P3 31 igitur: ergo C1ErL3P3R 32 post intentionum add. intuitarum visus L3 (scr. et del. intuitarum) 33 declaratum sit hoc: hoc sit declaratum R/sit corr. ex est P1; corr. ex fuerit S 36 vise om. P1

so, et virtus distinctiva comprehendit intentiones particulares
 que sunt in illa re visa secundum modum quo cognovit illas res
 40 visas ex prima forma illius rei vise existente in anima. Sed iste
 intentiones particulares que sunt in visibilibus mutantur secun-
 dum transitum temporis, et cum hoc visus non comprehendit
 intentiones que sunt mutate in re visa per cognitionem prece-
 dentem. Et cum mutatio fuerit occulta, non bene manifesta,
 45 non comprehenditur a visu primo aspectu, et non comprehen-
 ditur quando non fuerit valde manifesta nisi per intuitionem.
 Verbi gratia quod, quando visus cognoscit aliquem hominem,
 et fuerit facies illius hominis munda, et certificaverit visus
 formam eius, deinde recesserit ille homo a visu longo tempore,
 50 et contingit in facie eius macula, et fuerit occulta illa macula, et
 comprehenderit ipsum post ipsam distinctionem, cognoscet
 ipsum apud comprehensionem. Sed tamen non propter com-
 prehensionem et cognitionem illius hominis comprehendet
 maculam in facie eius nisi sit manifesta, et si non intuerit ip-
 55 sam, comprehendet ipsum non secundum suum esse. Et si
 intuerit ipsum puriori intuitione, apparebit ei macula que est in
 facie eius, et tunc comprehendet formam eius secundum suum
 esse.

[4.30] Et similiter, quando visus comprehenderit aliquam
 60 arborem, et intuerit ipsam, et certificaverit formam eius, dein-
 de recessit ab ea diu dum crevit illa arbor, et augmentabatur,
 et mutabatur figura eius, et crevit et intendebatur aliquis rubor
 in ea (si forte aliquis esset in ea), et illa mutatio que contingit
 in arbore non fuerit modica, deinde si revertatur visus ad illam
 65 arborem et cognoscat eam, non comprehendet apud compre-
 hensionem et cognitionem illam modicam mutationem que
 contingit in ea. Si autem intuerit ipsam secundo et cum hoc

42 ante transitum *scr. et del.* divisio P1/cum hoc: sic R/comprehendit: comprehen-
 derit P3 43 in re visa *mg. a. m.* C1/post in *add.* illa EP3R 45 primo aspectu: post
 aspectum P3 46 non *om.* P3 47 quod *om.* R/post quando *add.* nunc E; *add.* non
 ErL3; *add.* homo P3/visus *om.* EErP3; *inter.* L3/cognoscit: cognoscet C1L3 49 reces-
 serit: recessit EP3/recesserit . . . illa (50) *mg.* L3 50 contingit: contingat R
 51 ipsam: istam EP3R/distinctionem: dispositionem C1ErR; *alter.* in dispositionem
a. m. ES 54 si non *inter.* C1/intuerit: fuerit intuitus R/ipsam (55): ipsum ErP1S
 55 ante comprehendet *add.* non R/comprehendit: comprehendit C1L3/ipsam: ipsam
 EP3/non *om.* R 56 intuerit ipsum: intuitus fuerit ipsam R 60 intuerit: intuitus
 fuerit R 61 recessit: recesserit C1EP3R/ea: eadem EP3R/diu *inter.* *a. m.* E/crevit:
 creverit R/augmentabatur: auctae fuerit R 62 mutabatur: mutata R/figura eius
transp. C1/crevit: cernit S/crevit . . . ea² (63): facta sit in ea aliqua mutatio R/et³ *om.* S
 63 contingit: fuerit EP3R 64 post si *scr. et del.* fuerit S 65 cognoscat: cognoscet
 EErL3P3; *alter.* ex cognoscet in cognoscit *a. m.* C1 66 ante et *add.* illam C1L3/et:
 per R 67 intuerit: intuitus fuerit R/cum hoc: simul R

fuerit rememorans vere forme quam habebat in prima vice,
 70 comprehendet mutationem que contingit in ea et certificabit
 formam eius secundo. Et si non intuerit ipsam, non erit illa
 forma quam comprehendit ex illa arbore per cognitionem
 antecedentem ipsa forma vera quam habet post secundam
 comprehensionem.

[4.31] Et similiter, quando visus comprehenderit parietem
 75 in quibusdam locis, et ille paries fuerit planus, et fuerint in eo
 picture et sculpture, et intuerit visus illum parietem, et certifi-
 caverit formam eius, deinde recesserit ab illo loco diu, et con-
 tingit in illo pariete post mutatio ex asperitate superficiei aut
 ex intentione quarumdam picturarum, et non fuerit illa mutatio
 80 valde manifesta, deinde si revertatur visus ad illum locum, et
 aspexerit illum parietem, et fuerit rememorans forme prime,
 igitur comprehendet ipsam apud primam visionem. Sed apud
 comprehensionem et cognitionem non comprehendet mutatio-
 nem occultam que in eo contingit, et ipse cognoscet formam
 85 eius sine aliqua mutatione. Si ergo in eo contingit aliqua asper-
 itas, existimabit ipsam esse lenem sicut assuevit esse, et si pic-
 ture primo fuerint vere certificate et fuerint mutate, existimabit
 eas quasi esse certificatas.

[4.32] Et omnia visibilia que sunt apud nos sunt recipientia
 90 mutationem secundum colorem, et figuram, et magnitudinem,
 et situm, et lenitatem, et asperitatem, et ordinationem partium
 et secundum multas intentiones particulares. Quoniam nature
 earum sunt mutabiles et preparate passioni ab eo quod accidit

68 rememorans: memor R/vere forme *transp.* P1S/post forme *add.* eius C1EErL3P3R/
 in prima: primae R 69 post que *add.* non P1/certificabit *corr.* ex certificabis S
 70 intuerit: fuerit intuitus R 71 quam: quod P3/quam comprehendit *corr.* ex
 comprehendit quam Er/comprehendit: comprehendet ErS 72 post: per L3; om.
 EErP3R (*inter.*)/post post *add.* ipsam C1/secundam: secunda ErP3R; *inter.* L3
 73 comprehensionem: comprehensio ErP3; comprehensione R; *corr.* ex comprehensio
 EL3 (*a. m. E*) 74 comprehenderit: comprehendit P1; comprehendet S 75 planus:
 planis ErP3/fuerint: fuerit Er 76 intuerit: intuitus fuerit R 77 post loco *scr.* et
 del. et C1L3/contingit (78): contingat R 78 in . . . mutatio: post mutatio in illo
 pariete EP3/aut om. P1 79 ex intentione *alter.* in ex mutatione *a. m.* C1/intentione:
 imutatione P1; *corr.* ex mutatione *a. m. E*; *alter.* in mutatione *a. m.* S 81 rememorans:
 memor R/forme: forma P3 82 igitur om. R/comprehendit ipsam: comprehendit
 illam C1 83 et: per R 85 aliqua¹: quali E; *corr.* ex quali P3/post aliqua¹ *add.*
 comprehensione L3/mutatione *alter.* in mutationis L3/post mutatione *add.* absque
 comprehensione mutationis C1/post eo *scr.* et del. quod P1/aliqua²: alia E 86 ipsam:
 ipsum P1/assuevit: consuevit EP3R/post assuevit *add.* esse etiam E (*scr.* et del. esse)
 87 vere certificate *transp.* R/fuerint²: fiunt L3 88 quasi esse *transp.* ERS/quasi . . .
 certificatas *corr.* ex esse . . . quasi P3 89 omnia: anima Er/sunt² *mg. a. m. E*/sunt
 recipientia *transp.* EP3 90 et² *inter.* P1/magnitudinem *corr.* ex magnitudinis P1
 91 lenitatem et asperitatem: asperitatem et lenitatem EP3R

95 eis ex extrinseco, et mutatio quam est possibile comprehendere a
 visu est possibile in omnibus illorum. Et quamvis in eis sit ali-
 qua mutatio quam non est possibile apparere visui, nichil est
 ex eis in quo non accidit ex extrinseco mutatio possibilis ap-
 parere visui. Et cum omnia visibilia sint preparata mutationi
 100 possibili comprehendere a visu, nullum ergo visibile quod visus
 comprehendit modo, et erat prius comprehensum et certifica-
 tum, est certificatum apud secundam comprehensionem a visu,
 scilicet quod visus sit securus secundo quod non fuerit muta-
 tum cum mutatio sit possibilis in omnibus visibilibus. Cum
 ergo visus comprehenderit aliquam rem visam quam ante com-
 105 prehenderit, et intuerit ipsam, et certificaverit formam eius, et
 fuerit rememorans sue forme apud comprehensionem, cognos-
 cet ipsam. Et si in illa re visa contingit mutatio manifesta,
 comprehendet illam mutationem apud visionem. Si autem non
 fuerit manifesta, cognoscet illam rem et existimabit illam esse
 110 apud cognitionem secundum modum primum. Et cum hoc, si
 non iteraverit intuitionem, non erit securus quod forma quam
 ante cognoscebat sit remanens secundum suum esse, cum sit
 possibile quod in ea contingerit mutatio occulta que non potest
 apparere nisi per intuitionem. Si ergo iteraverit intuitionem,
 115 certificabit formam eius, et si non iteraverit intuitionem, non
 erit comprehensio illius rei vise certificata. Comprehensio ergo
 visibilium per cognitionem precedentem, et per signa, et per
 modicam intuitionem non est vera comprehensio; et visus non
 comprehendit rem visam vera comprehensione nisi per intuitio-
 120 nem rei vise apud comprehensionem eius, et per consideratio-
 nem omnium intentionum que sunt in illa re visa, et per dis-
 tinctionem omnium apud comprehensionem illius rei vise.

[4.33] Visio ergo erit secundum duos modos: visio in pri-

94 *post eis scr. et del. et P1/ex om. P1R; inter. L3/extrinseco: extrinsecus R/et... extrinseco*
 (97) *mg. L3/post et add. quia R/quam: quando EP3; om. R/post possibile add. in eis*
possibile est ipsam EP3R 95 *est possibile om. EP3R/illorum: illis EP3R/in eis sit:*
sit in eis EP3R 96 *quam: que EP3R/est possibile: potest R/possibile: impossibile*
ErP3; corr. ex impossibile E/post apparere scr. et del. a visu in omnibus illis et quamvis
sit P3/post est² add. etiam L3; add. tamen R; scr. et del. eis P1 97 *accidit ex extrinseco:*
accidat extrinsecus R/possibilis: quae possit R 99 *possibili: quae possit R*
 100 *et² om. R* 101 *est certificatum mg. a. m. C15; om. EL3P3/certificatum om. P1R/*
secundam comprehensionem transp. R 102 *scilicet corr. ex secundum a. m. C1/sit*
om. P1 104 *comprehenderit¹: comprehendit P1/comprehenderit (105): compre-*
hendidit EP3R 105 *intuerit: intuebit C1L3; intuitus fuerit R* 106 *rememorans:*
memor R/sue forme: forme eius Er 109 *post rem add. visam L3/illam esse transp.*
L3/post illam add. rem P1S/esse om. S/post esse scr. et del. secundam P1 110 *cum*
hoc: sic R 112 *sit remanens: remaneat R* 113 *contingerit: contingit C1L3*
 117 *post et² add. non P1* 118 *non² inter. P3* 119 *post per scr. et del. motum P1*
 123 *duos corr. ex diversos a. m. E/post visio² add. ergo EP3 (scr. et del. E)*

mo aspectu et visio que est per intuitionem. Et per visionem
 125 que est in primo aspectu comprehendet intentiones manifestas
 rei vise tantum, et non certificatur per huiusmodi aspectum
 forma rei vise. Et visio que est in primo aspectu quandoque
 est solum fantastica et quandoque cum cognitione precedente.
 Et visio talis que est secundum fantasiam est visio visibilium
 130 que visus non cognoscit apud aspectum, et cum hoc non intue-
 tur ipsa. Et visio que est secundum fantasiam cum cognitione
 precedente est visio visibilium que visus ante cognoscit, et cum
 hoc non intuerit intentionem eorum. Et secundum utriusque
 dispositiones eorum non comprehendit visus per fantasiam
 135 veritatem rei vise, sive precognoverit illam rem visam sive non.
 [4.34] Et visio per intuitionem erit secundum duos modos:
 visio sola intuitionem et visio per intuitionem cum cognitione
 precedente. Visio autem que est sola intuitionem est visibilium
 que ante visus non comprehendit aut non est rememorans
 140 comprehensionis eorum quando intuetur modo ipsa. Et visio
 per intuitionem cum precedenti cognitione est visio omnium
 visibilium que visus comprehendit et est rememorans visionis
 eorum quando intuerit intuitionem eorum et consideraverit
 intentiones omnes que sunt in eis. Et ista visio dividitur in duo
 145 quorum unum est visio assueta visibilium assuetorum, et ista

124 *post aspectu scr. et del.* comprehendet intuitiones manifestas rei vise tantum C1/
 intuitionem: intuitionem P3 125 *post* comprehendet *add.* visus R; *scr. et del.* per P3/
 intentiones *corr.* ex intuitiones L3/manifestas: manifeste Er; *corr.* ex manifeste L3/
 manifestas rei vise (126): rei vise manifestas EP3R (manifestas: manifeste EP3)
 126 certificatur: certificabit P1S 127 forma: formam P1/et visio *inter.* L3
 130 cognoscit: cognovit R/intuetur (131): intuerit L3; intuetetur S 131 secundum
 fantasiam *corr.* ex fantasiam secundum Er/cognitionem *corr.* ex cognitionei P3
 132 *ante* est *scr. et del.* et C1L3/ante *om.* S/ante cognoscit *transp.* EP3R/post *ante* *inter.*
vel non a. m. L3/cognoscit: cognovit EEP3R; precognoscit P1S; *alter.* in cognovit
a. m. C1 133 intuerit: intuetur EP3R/intentionem: intuitionem ErS; intentiones R;
corr. ex intuitionem L3; *alter.* in intuitionem *a. m.* E/utriusque dispositiones (134) *transp.*
 EP3R/post utriusque *add.* usque S 134 dispositiones: dispositionem P1R/eorum:
 earum R/post visus *scr. et del.* dispositiones E 135 visam *om.* R 136 *post* et *add.*
cum Er/post modos *add.* scilicet EP3R; *add.* etiam P1 137 intuitionem: *alter.* ex
 cognitionem in intentionem *deinde* *corr.* ex intentionem *a. m.* E/cum *om.* EP3/cognitionem:
 cognitionem P3; *corr.* ex scientia *a. m.* E/cognitionem precedente (138) *transp.* R
 138 precedente: scientia precedentem P3 139 ante visus *transp.* EP3R/rememorans:
 memor R 140 comprehensionis *corr.* ex comprehensiones *a. m.* C1/eorum *om.* P3/
 intuetur . . . ipsa *scr. et del.* P3 (modo: non); modo *inter.* *a. m.* E 141 precedenti:
 precedente EP3R/precedenti cognitionem *transp.* EP3/cognitionem: scientia P3R; *corr.* ex
 scientia *a. m.* E/post visio *scr. et del.* i P3 142 visus *om.* S/rememorans: memor R/
 visionis: comprehensionis EP3R 143 intuerit: intuitus fuerit R; *corr.* ex intuetur P1/
 intuitionem: intentionem EP3; intentiones R/intuitionem eorum *transp.* EP3R
 144 duo: duos modos EP3R 145 unum: unus EP3R; una P1S/post visio *add.*
 quidem C1EL3P3 *transp.* P1

pars erit per signa que comprehenduntur modica intuitione et per considerationem quarumdam intentionum que sunt in illa re visa cum cognitione precedente. Et ista visio in maiori parte est in tempore insensibili, et comprehensio illius quod comprehenditur secundum hunc modum non est comprehensio in fine certificationis. Pars autem secunda est que erit per finem intuitionis et per considerationem omnium intentionum que sunt in re visa apud comprehensionem illius rei vise et cum cognitione precedente. Et erit in maiori parte in tempore sensibili, et diversatur tempus secundum intentiones que sunt in re visa.

[4.35] Et visio que est per quam visibilia assueta comprehenduntur comprehensione in fine certificationis non est nisi per intuitionem omnium intentionum que sunt in re visa, et per considerationem omnium partium rei vise, et per distinctionem omnium intentionum que sunt in re visa apud comprehensionem rei vise, sive precognoverit illam rem visam sive non. Et ista certificatio que est respectu sensus est intentio certificata, et est dicere finem certificationis in istis locis finem illius quod possibile est comprehendi a sensu. Et cum omnibus istis comprehensio visibilium a visu est secundum fortitudinem visus, quoniam sensus visuum oculorum diversatur secundum vigorem et debilitatem.

[4.36] Secundum ergo istos modos erit comprehensio visibilium a visu, et isti sunt omnes modi visionum, et hoc est illud quod intedebamus ad declarandum in isto capitulo. Et iam complevimus divisionem omnium visibilium et divisionem omnium intentionum visibilium, et declaravimus omnes intentiones per quas pervenit visus ad comprehensionem visibilium et

146 comprehenduntur: comprehenditur *Er*/intuitione: intentione *S* 148 *post* cognitione *scr. et del.* preceni *predenti* *P1*/precedente: precedenti *P1S*/ista: illa *EP3R*/*post* visio *add.* est *R* 149 *est om.* *R* 151 certificationis: certitudinis *EP3R*/que erit *om.* *R*/erit: est *EP3*/intuitionis (152): intentionis *Er* 152 *post* in *add.* illa *P1S* 154 in tempore *inter.* *L3*/sensibili: insensibili *EP3* 156 *post* est *add.* secundum hunc modum *P1RS* (*post* modum *add.* est non *S*)/quam: quem *R*/comprehenduntur comprehensione (157) *corr. ex* comprehensione comprehenduntur *E* 157 comprehensione: apud comprehensionem *C1L3*/certificationis: certitudinis *EP3*/non est *om.* *S* 158 *post* visa *scr. et del.* apud comprehensionem rei vise *C1* 160 intentionum: distinctionum *P1*/intentionum que *corr. ex* que intentionum *L3* 161 visam *om.* *C1EL3P3R* 162 respectu: respectus *Er* 164 possibile est: potest *R*/comprehendi: comprehendet *P1*/a sensu *inter. a. m.* *E* 166 visuum: visus *EP1P3R*; *corr. ex* visum *a. m.* *S*/oculorum: occulorum *Er* 167 *ante et scr. et del.* d *Er* 169 a visu *om.* *S*/sunt *om.* *P1S*/visionum: visibilium *P3R* 170 ad declarandum: declarare *EP3R*/iam: etiam *L3*; *corr. ex* etiam *a. m.* *C1* 171 divisionem¹: de visione *P1S*; dictionem *P3*/et . . . omnium (172) *om.* *P1S*/et . . . visibilium (172) *mg. a. m.* *C1* 172 visibilium *om.* *P1S* 173 pervenit: venit *EP3R*

intentionum visibilium, et distinximus omnes partes in quas
175 dividuntur omnes modi visionum. Iste sunt intentiones quas
intendebamus declarare in isto tractatu.

174 *post visibilium scr. et del.* et intentionum visibilium S 175 *post visionum add.* et
R/*post iste add.* ergo C1P3

TERTIUS TRACTATUS

Et est ex 7 capitulis.

- Primum capitulum est proemium;
Secundum de eis que debent proponi sermoni in deceptionibus
5 visus;
Tertium de causis quibus deceptio accidit visui;
Quartum in distinguendo deceptiones visus;
Quintum de qualitatibus deceptionum visus que fiunt solo
sensu;
10 Sextum de qualitatibus deceptionum visus que fiunt in cognitione;
Septimum de qualitatibus deceptionum visus que fiunt in
ratione.

[CAPITULUM 1]

- [1.1] Declaratum est in primo tractatu et secundo quomodo visus comprehendit visibilia secundum quod sunt si comprehensio eius fuerit recte, et quomodo certificat formam visi, et quomodo comprehendit unamquamque intentionum
5 particularium secundum quod est, et quomodo certificat illam. Sed non omne comprehensibile a visu comprehenditur ab eo secundum quod est, nec omne quod videtur ab inspiciente ipsum comprehendi in rei veritate est recte comprehensum. Sed multotiens decipitur visus in multis eorum que comprehendit
10 ex visibilibus, et comprehendit illa alio modo ab eo quo sunt. Et forte percipit suam deceptionem etiam cum decipitur, et forte non, sed reputat se bene comprehendere. Cum enim

1 *post tractatus scr. et del. est P1* 2 *et om. EP3R/et est transp. L3/est om. S* 4 *secundum: secundo P1/eis: ijs R/que inter. a. m. E/proponi: praeponi R* 6 *causis corr. ex causas Er/post causis add. de Er/accidit: accidet P1* 7 *quartum: quarto P1/in om. P1S/deceptiones: deceptionem P1S* 12 *fiunt corr. ex sunt S* 1 *ante declaratum add. primum capitulum Er/post et add. in C1L3* 2 *comprehendit: comprehendat R/si: et Er; corr. ex et L3* 3 *certificat: certificet R* 4 *comprehendit: comprehendat R* 5 *certificat: certificet R* 6 *ab corr. ex a a. m. C1* 7 *post videtur scr. et del. abspi P1/inspiciente: aspiciente EP3R* 8 *ipsum om. R* 9 *comprehendit (10): comprehenditur P1* 10 *ex: in P3/comprehendit: comprehendet P1/post eo scr. et del. quo S* 11 *etiam: et Er (scr. et del.); om. P1S*

visus comprehendit aliquod visum per spatium remotum, tunc
 mensura eius videbitur minor quam vera mensura, et quando
 15 illud visum fuerit forte propinquum visui, comprehendet men-
 suram eius maiorem vera. Et amplius quando visus compre-
 henderit quadratum aut polygonium a remoto, comprehendet
 eum rotundum, si fuerit equalium dyametrorum, aut longum, si
 fuerit inequalium dyametrorum, et si comprehenderit speram a
 20 remotissimo, comprehendet eam planam. Et talia sunt multa
 et multimoda, et omnia que sunt comprehensa a visu tali modo
 sunt fallibilia.

[1.2] Amplius quando visus inspexerit aliquam stellam,
 comprehendet eam quiescentem, licet stella tunc moveatur; et
 25 cum inspiciens revertatur ad scientiam sciet illam stellam mo-
 veri apud aspectum. Et cum inspiciens distinxerit illud, statim
 percipit se decipi in hoc quod comprehenderit de quiete stelle.
 Et cum aliquis inspexerit aliquod individuum super faciem ter-
 re a remotissimo, et illud individuum fuerit motum motu tar-
 30 dissimo et non diu duraverit aspectus, tunc in tali statu aspec-
 tus comprehendet ipsum quiescens. Et si aspiciens non per-
 ceperit ante motum illius individui, et non diu duraverit in eius
 oppositione, tunc non percipiet se esse deceptum in hoc quod
 comprehendit de quiete illius individui, et in comprehensione
 35 huiusmodi erit deceptus. Et cum hoc non percipiet se decipi.
 Accidet igitur visui deceptio in multis eorum que comprehen-
 dit, que forte percipitur ab eo, et forte non.

[1.3] Et cum in duobus tractatibus precedentibus sit de-
 claratum quomodo visus comprehendit visibilia secundum
 40 quod sunt, in hoc autem capitulo declaratum est ex eis que
 diximus quod multotiens accidit visui deceptio in multis eorum
 que comprehendit, remanet declarandum quare deceptio ac-

13 visus *om.* C1/comprehendit: comprehenderit R; *corr. ex* comprehendit S/visum per
 spatium *inter. a. m.* E/post remotum *add. et Er* 16 post visus *scr. et del.* certific P1
 17 polygonium: polygonum L3R; *corr. ex* pologonium P3 18 eum: illud R/fuerit: fuit
 P1/aut . . . dyametrorum (19) *om.* P3/longum *corr. ex* longium S 23 inspexerit:
 inspexit P1 24 moveatur: movetur C1; *corr. ex* removeatur P3 25 post inspiciens
scr. et del. moveatur et cum P1/revertatur: revertetur R/illam stellam *transp.* P1/illam
 . . . moveri (26) *corr. ex* stellam . . . illam S 26 distinxerit *alter. in* inspexerit *a. m.* E
 27 percipit: comprehendit EP3; comprehendet R/comprehenderit: comprehendit P1S
 29 ante et *add.* intervallo R/ante fuerit *scr. et del.* super faciem S/tardissimo (30): tradissimo
 S; *corr. ex* tradissimo *a. m.* Er 30 non: si P1/tali *om.* Er; *inter.* L3/tali statu *transp.* L3/
 statu: casu P1/aspectus (31): aspiciens P3R; *corr. ex* aspiciens *a. m.* E 31 si *inter. a. m.*
 E/perceperit (32): percepit C1S 33 se *om.* EP3 35 huiusmodi: huius R/cum hoc:
 tamen R 36 accidit: accidit L3P1RS; *inter.* L3/igitur: ergo EP3/in *mg. a. m.* C1/que:
 quod C1; *corr. ex* quod L3/comprehendit que (37) *om.* C1L3 37 que: et R; *alter. in*
 quod *a. m.* E 38 in *inter.* P1; sit *corr. ex* fuerit P3 39 comprehendit: comprehen-
 dat R 40 eis: hiis P1

cidit visui et quando et quomodo. Nos autem in hoc tractatu
 contenti sumus ex deceptionibus visus in eis que comprehendit
 45 recte, et declarabimus causam in hoc, et diversitates deceptio-
 num, et quomodo accidit unaqueque deceptio.

[CAPITULUM 2]

[2.1] Declaratum est in primo tractatu quod visus nichil
 comprehendit ex visibilibus nisi secundum verticationes line-
 arum radialium et quod ordo visibilium et partium eorum non
 comprehenditur nisi ex ordinatione linearum radialium. Et
 5 dictum est etiam quod unum visum quod comprehenditur duo-
 bus oculis in simul non comprehenditur unum nisi quando
 positio eius in respectu duorum oculorum fuerit positio con-
 similis; et quod si positio fuerit diversa, tunc unum compre-
 hendetur duo. Sed unumquodque visibilium assuetorum que
 10 semper comprehenduntur a duobus visibus semper compre-
 hendetur unum. Unde oportet nos declarare quomodo unum
 visum comprehenditur a duobus visibus unum in maiori parte
 temporis et in pluribus positionibus, et quomodo positio unius
 visi ab ambobus oculis in maiori parte temporis et in pluribus
 15 erit consimilis. Et declarabimus etiam quomodo positio unius
 visi ab ambobus visibus erit positio diversa et quando accidit
 hoc. Et iam diximus hoc in primo tractatu, et declaravimus
 ipsum universaliter non determinate.

[2.2] Dicamus quod quando inspiciens inspexerit aliquod
 20 visum, tunc uterque visus erit in oppositione illius visi, et cum

44 ex: de EErP3/deceptionibus: exceptionibus Er 45 post et¹ add. etiam C1S
 46 accidit: accidat R; corr. ex accidente S/post accidit add. in P1/unaqueque: unaqua-
 que P1 2 comprehendit: comprehendat R/nisi om. P3/post verticationes add. re-
 flexas EP1P3; add. refractas R 5 etiam om. L3/unum visum transp. EP3/visum
 mg. C1 6 in om. R/post simul scr. et del. et Er/non mg. a. m. Er/comprehenditur:
 comprehendit EP3; corr. ex comprehenduntur S 7 post eius add. fuerit P1/respectu:
 conspectu Er/fuerit om. P1 8 et om. Er; inter. a. m. E/unum comprehendetur (9)
 transp. EP3R/comprehendetur (9): comprehendet EErL3P3 9 ante duo scr. et del. et
 oculi sunt C1 10 visibus: visibilibus Er; corr. ex visibilibus L3S/comprehendetur
 (11): comprehenduntur E; corr. ex comprehenditur P3 11 ante unde scr. et del. unde
 oportet nos declarare quomodo unum visum comprehenditur a duobus visibilibus sem-
 per comprehenditur unum L3 12 comprehenditur: comprehendetur L3;
 comprehendatur R/post a scr. et del. 2 P3/visibus corr. ex oculis L3/maiori: maiore E
 13 post pluribus scr. et del. erit consimilis Er/positionibus . . . pluribus (14) om. P3; mg. L3
 14 ab inter. a. m. E 15 etiam: et Er 16 visibus corr. ex oculis Er/quando:
 quomodo EP3R/accidit: accidat R 17 hoc² . . . declaravimus om. P3/declaravimus:
 declarabimus Er 18 post ipsum scr. et del. ipn P1/non inter. E/determinate:
 determinare P3/post determinate scr. et del. nec E 19 post dicamus inter. igitur L3;
 add. ergo R/quando: cum EP3R/inspexerit . . . inspiciens (21) mg. a. m. S

inspiciens direxerit pupillam ad illud visum, tunc uterque diriget pupillam ad illud visum directione equali, et cum visus fuerit motus super rem visam, tunc uterque visus movebitur super illud.

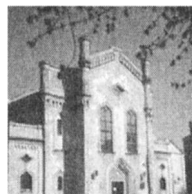
- 25 [2.3] Et cum inspiciens direxerit pupillam ad rem visam, tunc axes duorum visuum congregabuntur in illa re visa et coniunguntur in aliquo puncto illius superficiei, et si inspiciens moverit visum per illam rem visam, tunc illi duo axes movebuntur simul super superficiem illius visi et per omnes partes
30 eius. Et universaliter duo oculi sunt equales in omnibus suis dispositionibus, et virtus sensibilis que est in eis est eadem, et actio et passio eorum semper est equalis et consimilis. Et si alter visus fuerit motus ad videndum, statim reliquus movebitur ad illud visum illo eodem motu, et si alter visus quieverit,
35 reliquus quiescet; et impossibile est ut alter visus moveatur ad videndum et reliquus quiescat nisi impediatur.

- [2.4] Et declaratum est in predictis quod inter quodlibet visum et centrum visus est piramis ymaginabilis apud visionem cuius conus est centrum visus et basis superficies visi
40 quod visus comprehendit. Sed ista piramis continet omnes verticationes ex quibus comprehendit illam rem visam. Cum igitur duo axes amborum visuum fuerint coniuncti in aliquo puncto superficiei visi, tunc superficies visi erit basis communis ambabus pyramidibus radialibus figuratis inter duo centra
45 amborum visuum et illud visum, et tunc positio puncti in quo duo axes sunt coniuncti apud ambos visus est positio consimilis, quia est oppositus duobus mediis amborum visuum, et duo axes qui sunt inter illud et duos visus sunt perpendiculares super superficiem duorum visuum. Quod autem remanet
50 ex superficie visi inter quodlibet punctum in eo et duo centra amborum visuum sunt due linee quarum positio in respectu duorum axium erit positio consimilis in parte—scilicet quoniam

21 *post inspiciens scr. et del. im P3/post visum scr. et del. du P1/post uterque add. visus R*
23 *rem corr. ex partem L3* 25 *inspiciens: visus EP3R* 26 *visuum: visibilium Er*
27 *coniunguntur: coniungentur R* 28 *per: super C1* 29 *super inter. L3*
31 *in eis rep. Er* 32 *post et² add. omnino EP3R (inter. a. m. E)* 33 *post visus scr. et del. visus P1* 35 *quiescet: quiescit R* 36 *quiescat: quiescet P1* 37 *predictis: preteritis P1RS*
39 *conus: vertex R* 40 *sed: et R* 42 *igitur: ergo C1EP3R/amborum: duorum EP3* 43 *puncto corr. ex positione a. m. C1* 44 *ambabus: ambobus Er; corr. ex ambobus a. m. C1* 45 *amborum om. Er/et illud visum om. P1*
47 *oppositus: oppositum R/post duobus add. centris C1* 48 *axes om. Er/duos: duo P1; ipsos P3/perpendiculares (49) corr. ex pendiculares S* 50 *ex: de R/visi: nisi Er/in eo: eius R/post et add. inter R/post centra add. duorum visuum et punctum superficiei visi in quo coniunguntur duo axes P1* 51 *amborum . . . centra (53) mg. a. m. E/post visuum scr. et del. f P1*

omnes due linee ymaginabiles inter duo centra duorum visuum
et punctum superficiei visi in quo coniunguntur duo axes am-
55 borum visuum ambe erunt declinabiles a duobus axibus ad
unam partem. Nam omnis punctus superficiei visi in quo duo
axes coniunguntur declinabitur a puncto coniunctionis ad ean-
dem partem; punctus autem coniunctionis est super utrumque
axem. Remotiones autem istarum linearum a duobus axibus
60 sunt equales, quoniam omnes due linee exeuntes a duobus cen-
tris duorum visuum ad quodlibet punctum punctorum valde
propinquorum puncto coniunctionis equaliter distant a duobus
axibus quantum ad sensum. Duo enim axes exeuntes ad
punctum coniunctionis erunt equales, aut non erit inter illas
65 diversitas sensibilis quando res visa non fuerit valde propin-
qua visui, et distantia eius a visu fuerit mediocris. Et similiter
est dispositio cuiuslibet puncti multum propinqui puncto con-
iunctionis—scilicet quod omnes due linee exeuntes a duobus
centris duorum visuum ad quodlibet punctum eorum fere non
70 differunt in longitudine quantum ad sensum, et forte erunt
equales. Quando autem due linee declinantes coniuncte fuerint
in superficie in qua sunt duo axes, erunt inequales, nam linea
que exit a puncto in quo duo axes coniunguntur ad punctum
declinans ab illo continet cum duobus axibus angulos inequal-
75 es. Et duo axes sunt equales, et linea copulans duo puncta est
communis, quapropter due linee declinantes erunt inequales.
Sed ista inequalitas non operatur in sensu si punctus declinans
fuerit propinquus puncto coniunctionis. Si autem due linee
declinantes fuerint sub axibus aut super illos, possunt esse
80 equales, duo enim anguli quos continent duo axes cum linea
continuante duo puncta possunt esse equales si punctus fuerit
sub axibus aut super eos. Et in positionibus que sunt inter has
duas positiones erit diversitas que est inter duas declin-

54 visi: visae R/amborum (55): duorum R 55 ambe: ambo L3; om. R 56 visi om.
EP3; corr. ex visis L3 57 declinabitur: declinabit R 58 autem: vero R 59 ista-
rum linearum transp. P3 60 post equales scr. et del. quoniam omnes due linee
exeuntes a duobus axibus sunt equales C1/exeuntes corr. ex exeunte a. m. C1 63 ad²
corr. ex a L3 64 post inter scr. et del. duos P3/illas: eos EP3R; illos S; alter. in illos L3
70 et: sed R/forte: fere P3R; corr. ex fere a. m. E/post erunt scr. et del. erunt P3 71 au-
tem: vero R/due linee transp. EP3R/post lineae add. equales Er/coniuncte fuerint
transp. EP3R 73 a: ex EP3R/post quo add. sunt C1L3 (scr. et del. C1) 74 post illo
scr. et del. ut nisi E 75 et . . . equales mg. a. m. E/est communis (76) transp. P1S
76 quapropter: quare P1S 77 sed . . . inequalitas rep. P1/sensu: sensum R/si corr.
ex sed L3 78 propinquus: propinquum R 81 continuante: continuata ErP1; corr.
ex continuata L3/continuante duo corr. ex continuata ad duo a. m. S/post continuante
add. ad ErP1 (mg. a. m. Er) 82 in positionibus: inter positiones P3; corr. ex inter
positiones a. m. E 83 lineas om. R



The Indefinite Identity of the Victim:

Poles, Jews & the Conflicting Memory of WWII

A Noon Lecture From:

Daniel Blatman

Institute of Contemporary Jewry

Hebrew University of Jerusalem

Date: Friday, September 9, 2006

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85 antes minor quam diversitas que est inter duas lineas primas
declinantes, et sic non erit inter eas differentia operans in sen-
sum.

[2.5] Ergo due linee exeuntes a duobus centris duorum
visuum ad puncta propinqua puncto in quo coniunguntur duo
axes non differunt fere in longitudine quantum ad sensum. Et
90 duo axes sunt equales, et linea que copulat punctum coniunc-
tionis cum puncto declinante ad quod exeunt due linee a duo-
bus centris est communis duobus triangulis factis ex istis lineis.
Ergo duo anguli qui sunt apud duo centra duorum visuum qui-
bus subtenditur apud superficiem visi linea communis erunt
95 equales, aut fere inter eas non erit diversitas sensibilis. Et isti
duo anguli semper erunt minimi quando punctus fuerit propin-
quissimus multum coniunctioni duorum axium.

[2.6] Et cum due linee que exeunt ad quodlibet punctum
propinquum puncto coniunctionis contineant cum duobus
100 axibus angulos equales, tunc remotio quarumlibet duarum
linearum exeuntium ad eundem punctum punctorum propin-
quorum puncto coniunctionis a duobus axibus duorum visuum
erit remotio equalis.

[2.7] Ergo positio cuiuslibet puncti superficie visi in quo
105 coniunguntur duo axes visuum, si fuerit propinquus puncto
coniunctionis in respectu duorum visuum, est positio con-
similis in parte et in remotione a duobus axibus. Dispositio
autem in punctis remotis a puncto coniunctionis declinantibus
ad unam partem ab ambobus axibus est talis anguli qui sunt
110 inter duas lineas exeuntes ad aliquem punctum eorum et inter
duos axes fortasse differunt diversitate aliquanta, et positio
omnium huiusmodi punctorum remotorum a puncto coniunc-
tionis in respectu duorum visuum est positio consimilis in
parte tantum sed non in remotione a duobus axibus. Visum

84 ante minor *scr. et del.* et sic non erit inter eas differentia operans in sensum ergo due
linee C1/minor... declinantes (85) *mg. a. m. S/lineas primas transp. EP3* 88 visuum:
in suum Er 89 post axes *scr. et del.* sunt equales L3 90 duo om. R/sunt equales
transp. S 91 post cum *add.* ipso C1 92 post lineis *add.* et axibus C1 93 qui
sunt *corr. ex* sunt qui E 95 eas: ipsas EP3; eos R; *corr. ex* eos a. m. C1 96 minimi:
in unum L3/punctus: punctis E; punctum R/propinquissimus multum (97): valde
propinquum R 97 duorum om. EP3 99 post coniunctionis *add.* axium C1;
contineant: continent R 100 quarumlibet duarum: quamlibet duorum Er
101 eundem: idem R 105 propinquus: propinqua P3; propinquum R 106 est:
erit EP3 107 in² om. S/post axibus *scr. et del.* n C1 108 declinantibus: decli-
nans P1S 109 anguli *corr. ex* anoguli S 110 inter¹: in E; *corr. ex* in P3/aliquem:
aliquod EP3R/post eorum *add.* remotorum C1/et om. L3; inter: a. m. C1/et inter *corr. ex*
inter et Er/inter² *corr. ex* int a. m. C1 111 ante duos *add.* eos L3/fortasse: forte P1/
aliquanta: aliquantula C1ErL3 114 non inter. S/in om. Er/visum: visuum C1;
positio R

115 igitur comprehensum ambobus visibus, cum fuerit alicuius
 quantitatis et propinquorum dyametrorum, positio cuiuslibet
 puncti apud duos visus est positio consimilis in parte et in
 remotione, quapropter forma eius statuetur in duobus visibus
 in duobus locis consimilis positionis a duobus visibus. Et cum
 120 visum comprehensum ambobus visibus fuerit maximorum dya-
 metrorum, tunc positio eius puncti in quo coniunguntur duo
 axes erit positio consimilis apud duos visus, et quanto magis
 appropinquaverint illi puncta que sunt in superficie illius visi,
 tanto magis positio illorum apud duos visus erit consimilis in
 125 parte et in remotione in simul. Puncta autem que sunt in su-
 perficie illius visi remota a puncto coniunctionis et declinantia
 ab ambobus axibus ad unam partem habent positionem con-
 similem in parte apud duos visus, et in remotione forte con-
 similem et forte non. Forma igitur partis que est apud locum
 130 coniunctionis huius visi et eius que continet punctum coniunc-
 tionis et eius quod est illi propinquum, instituitur in duobus
 locis duorum visuum consimilis positionis in omnibus disposi-
 tionibus. Et instituentur forme partium residuarum remotarum
 a puncto coniunctionis circumdantium partem consimilis posi-
 135 tionis continue cum forma partis consimilis positionis. Et sic
 universum duarum formarum instituitur in duobus locis duo-
 rum visuum inter que non est maxima differentia in positione.
 Sed si fuerit, erit inter extrema tantum, et erit modica propter
 continuationem extremorum cum duobus mediis que sunt
 140 consimilis positionis; et hoc erit dum duo visus fixi fuerint in
 oppositione visi et duo axes fuerint fixi in uno puncto eius.
 Cum autem duo visus fuerint moti super rem visam et duo

115 igitur: ergo C1L3/post igitur add. cuiuslibet puncti visi R/comprehensum:
 comprehensi R/post comprehensum add. ab P1S/fuerit corr. ex fuerint P1 116 pro-
 pinquorum: propinquarum R; alter. in parvorum L3; alter. ex propinquioris in
 propinquiorum P1/positio . . . puncti (117) om. R 117 puncti: visi EP3/apud:
 ante P1S 118 in: a L3; corr. ex a a. m. C1/in . . . visibus om. R 120 post
 comprehensum add. ab P1/visibus om. L3; mg. a. m. C1/post fuerit scr. et del. o P3/
 maximorum: maximarum R 121 positio eius transp. EP3 122 et om. L3
 123 illi: isti EP3; illa Er/post illi add. duo L3R/illius: istius EP3/visi corr. ex visus L3
 124 post magis add. erit C1L3/post apud scr. et del. nos P1/erit om. L3 125 in¹ om. C1/
 in² om. R 126 remota inter. L3 127 habent: habet Er/positionem corr. ex
 proportionem L3 128 post forte add. habent C1 129 igitur: ergo P1S/que corr.
 ex qui P3/locum: punctum R 130 huius: huiusmodi Er/huius . . . coniunctionis
 (131) om. P3/que: quod C1E/punctum: locum E 131 illi: ei P1S 133 instituentur:
 constituentur L3/forme om. L3; mg. a. m. C1/remotarum corr. ex remortarum S
 134 circumdantium: circumdanorum Er 135 continue: continue C1; alter. in
 continue a. m. S/post consimilis add. parti P3 136 instituitur: instituetur EP3
 137 que: quando Er 138 sed: et R/post modica add. differentia EP3 139 post
 continuationem add. duorum EP1P3R 140 dum: cum C1L3R/visus: in P1/fixi
 fuerint transp. P1S/fuerint corr. ex erunt P3 141 oppositione: operatione EP3

axes fuerint translati ab illo puncto et fuerint moti in simul per
superficiem illius visi, tunc positio cuiuslibet puncti illius visi
145 et positio punctorum propinquorum illi in respectu duorum
visuum apud coniunctionem duorum axium in ipso erit positio
consimilis valde, et forma cuiuslibet partis visi apud motum
duorum axium per superficiem erit in duobus locis positionis
consimilis apud duos visus. Et sic forma omnium partium visi
150 apud motum et intuitionem erit consimilis dispositionis apud
ambos visus.

[2.8] Et similiter etiam quando visus comprehendit visibilia
separata in eadem hora in simul, et duo axes fuerint coniuncti
in aliquo eorum, et illud visum in quo sunt coniuncti duo axes
155 fuerit propinquorum dyametrorum, tunc forma illius visi institu-
etur in duobus locis duorum visuum consimilis positionis. Et
etiam forma eius quod propinquum est illi viso, si fuerit parve
quantitatis, instituetur in duobus locis duorum visuum inter
quorum positiones non erit differentia sensibilis. Forma autem
160 visi remoti a viso in quo duo axes coniunguntur quando ambo
visus comprehendunt illud visum, dum duo axes sunt fixi in
illo viso, instituetur in duobus locis duorum visuum consimilis
positionis in parte tantum et non in remotione; aut non omnes
partes eorum erunt consimilis positionis in remotione a duobus
165 axibus, nec forma erit certificata. Deinde si duo visus fuerint
moti, et duo axes, et fuerint coniuncti in unoquoque visibilium
comprehensorum in simul, tunc forma uniuscuiusque eorum
instituetur in duobus locis consimilis positionis in respectu
duorum visuum in parte et in remotione; et tunc certificabitur
170 forma uniuscuiusque illorum visibilium.

[2.9] Et multotiens coniunguntur duo axes amborum visu-
um in aliquo viso, et cum hoc duo visus comprehendent aliam
rem visam cuius positio in respectu duorum visuum erit diver-

143 *post puncto add. medio C1/in om. R/in simul: consimilis L3/per: super P1*
144 *illius¹ om. R/tunc . . . puncti mg. a. m. E/illius visi² om. EP3* 145 *in om. P1*
146 *post axium scr. et del. per superficiem C1* 147 *post cuiuslibet add. puncti vel EP3*
149 *sic corr. ex si L3* 152 *comprehendit: comprehenderit R* 153 *in² om. R*
155 *propinquorum: propinquarum R; alter. in parvorum L3/instituetur (156) corr. ex*
instituitur E 156 *consimilis . . . visuum (158) om. Er* 157 *eius inter. L3/est: fuerit*
EP3/viso corr. ex visio L3S 158 *instituetur corr. ex instituetetur S/post visuum inter.*
sic scilicet L3; add. sic S 160 *viso corr. ex visu a. m. C1/ambo visus (161) transp. S*
161 *dum: deinde EP3* 163 *post aut add. si P1S* 165 *nec . . . certificata: erit non*
certificata forma eius P1S 166 *et¹ rep. P3/fuerint: sunt L3/in om. S* 167 *in om.*
R/uniuscuiusque: utriusque L3R 168 *instituetur: instituitur P1S* 169 *post*
visuum add. et C1 170 *uniuscuiusque inter. a. m. E/visibilium om. L3; mg. a. m. C1*
172 *viso corr. ex visu E/comprehendent: comprehendunt C1L3* 173 *duorum:*
amborum C1ErL3R/visuum corr. ex visibilium P1

sa in parte. Et hoc erit quando illud aliud visum fuerit propin-
 175 quius ambobus visibus viso in quo coniunguntur duo axes, et
 fuerit cum hoc inter duos axes aut fuerit remotius ab ambobus
 visibus viso in quo coniunguntur duo axes, et fuerit etiam inter
 duos axes cum fuerimus ymaginati extensos post coniunctio-
 nem, et visum in quo coniunguntur duo axes non cooperiet
 180 visum quod est remotius ipso aut cooperiet quoddam illius.

[2.10] Hiis igitur modis fit comprehensio visibilium ambo-
 bus visibus.

[2.11] Et etiam declaratum est in secundo tractatu quod axis
 185 radialis in utroque visu est eadem linea que non transmu-
 tatur, et quod pertransit centra omnium tunicarum visus et
 extenditur recte per centrum omnium tunicarum ad medium
 loci incurvationis ex concavo nervi super quem componitur
 oculus qui est apud foramen quod est in concavo ossis, et
 quod est inseparabilis ab omnibus centris, et quod positio eius
 190 apud omnes partes visus est positio semper eadem non trans-
 mutabilis apud motum visus nec apud quietem eius, et quod
 positio duorum axium apud duos visus est positio consimilis
 in respectu amborum visuum apud concavitatem nervi com-
 195 munis ex quo ultimum sentiens comprehendit formas visibi-
 lium. Ymaginemur igitur lineam rectam copulantem inter duo
 centra duorum foraminum que sunt in duabus concavitatibus
 duorum ossium continentium duos oculos, et ymaginemur duas
 lineas exeuntes a duobus centris duorum foraminum ossium
 extensas in duobus mediis duarum concavitatum nervorum.
 200 Hee igitur linee coniunguntur in medio concavitatis nervi com-

174 ante in add. pars EP1/post fuerit add. magis C1/propinquius (175): propinquum C1;
 propinquus P3; corr. ex propinquum L3 175 ambobus visibus transp. E/visibus inter.
 a. m. E/viso corr. ex visio L3/post viso add. illo C1/coniunguntur: adiunguntur Er;
 distinguuntur R; corr. ex adiunguntur L3/et . . . axes (177) mg. a. m. E 176 cum hoc:
 simul R 177 viso: visio S; corr. ex visos Er; corr. ex visio L3/fuerit: fuerint L3/etiam
 om. L3 178 post ymaginati add. axes C1P1S (mg. a. m. C1); add. eos R 179 co-
 operiet: cooperierit S 180 cooperiet: cooperierit ErL3P1S/quoddam: quiddam P1R;
 alter. ex quidam in quiddam S 181 hiis . . . visibus (182) mg. a. m. E/igitur: ergo
 C1L3R 182 visibus: visibilibus Er 184 que inter. a. m. E 186 per: super P1P3;
 corr. ex super a. m. E/centrum: centra R 187 quem: quod C1; quam EErL3
 188 in om. EP1; inter. a. m. S/ossis corr. ex omnis a. m. E 190 non inter. a. m. S
 191 apud¹ inter. L3/post nec scr. et del. est C1 192 duorum: duobus Er/post axium
 scr. et del. et L3/duos corr. ex duo L3/positio consimilis transp. C1L3 193 amborum:
 duorum EP3 194 post visibilium (195) add. est positio consimilis EErL3P3; scr. et del.
 est positio consimilis duorum axium C1 195 ymaginemur: ymaginetur C1;
 ymaginentur P1S; ymaginemus P3/igitur: ergo EP3R/post rectam scr. et del. rt P3; add. rt
 E (alter. in lk a. m.)/inter om. R 196 ante que scr. et del. un S 197 continentium
 corr. ex contingentium P1/duos om. ErP1S 198 ossium om. R 199 post
 concavitatum add. duorum EP3 200 nervi . . . concavitatis (201) om. ErP3/commu-
 nis (201) corr. ex consimilis L3

munis, quia positio duorum nervorum in respectu concavittatis communis nervi est positio consimilis; et positio harum duarum linearum apud lineam copulantem inter duo centra duorum foraminum erit positio consimilis, quia duorum nervorum positiones in respectu duorum foraminum erit positio consimilis. Et sic duo anguli qui sunt inter has duas lineas et lineam copulantem inter duo centra duorum foraminum equales.

[2.12] Et ymaginemur etiam lineam copulantem inter duo centra duorum foraminum divisam in duo equalia, et ymaginemur lineam exeuntem a puncto quod est in medio concavittatis nervi communis in quo due linee extense in concavittatibus duorum nervorum sunt coniuncte extensam ad punctum dividendum lineam copulantem duo centra duorum foraminum in duo equalia. Hec igitur linea erit perpendicularis super lineam copulantem duo centra duorum foraminum. Et ymaginemur istam perpendicularem extensam recte in partem oppositam visui; et sic ista linea erit fixa in eodem statu, et positio eius non transmutabitur, quia punctus qui est in medio concavittatis nervi communis in quo due linee extense in duobus mediis concavittatum duorum nervorum sunt coniuncte est unus non transmutabilis. Et punctus etiam qui dividit lineam copulantem duo centra duorum foraminum est etiam unus punctus non transmutabilis, quapropter positio lineae recte transeuntis per illa est una positio non transmutabilis. Hec igitur linea vocetur axis communis.

[2.13] Et ymaginemur apud punctum aliquem istius lineae in

201 concavittatis *om. R* 202 communis nervi *transp. EP3/est . . . consimilis scr. et del. P3/consimilis alter. in communis a. m. Er/harum mg. a. m. C1/harum duarum (203) transp. ErR/duarum linearum (203) transp. P1S* 203 copulantem: que copulatur *P1S/inter om. R* 204 erit . . . foraminum (207) *mg. L3/post consimilis add. et L3/quia . . . consimilis (205/206) mg. a. m. ES* 205 erit: est *P3R/positio corr. ex positionis P1* 206 ante et¹ *mg. HLK HKL a. m. S/has . . . lineas: duas . . . has P1* 207 inter *om. L3R/post foraminum add. erunt C1; mg. sunt P3/equales . . . foraminum (209) om. L3/post equales add. secus dissimilis esset positio nervorum R* 208 inter *inter. a. m. E/duo om. P3* 209 divisam: diviso *Er/equalia corr. ex eadem a. m. E* 210 ante lineam *add. etiam P1* 211 nervi communis *transp. ErP1S* 212 dividendum (213): dividens *R* 213 foraminum: foraminam *R* 214 hec: hic *P1* 215 centra *corr. ex extrema P1/ante et add. nam recta connectens centra duorum foraminum fit basis trianguli aequicruri cuius latera sunt rectae a medio nervi communis: itaque si recta sit a vertice in medium basis erit perpendicularis ad basim per 8p 10 d1 R* 217 post eodem *add. situ vel EP3* 218 punctus: punctum *R/qui: quod R; inter. a. m. S* 219 nervi communis *transp. EP3/extense om. P1* 220 concavittatum: concavittatibus *EP3/non om. C1L3* 221 transmutabilis: intransmutabilis *C1L3; transmutabile R/punctus: punctum R/post punctus scr. et del. ea S/post etiam add. quid P1/qui: quod R* 222 etiam . . . transmutabilis (223): unum non transmutabile *R/non om. Er* 223 recte *om. L3R; mg. a. m. C1* 224 post est *add. etiam P1/post una add. etiam S/non om. P1* 226 aliquem: aliquod *R/istius lineae transp. P1*

parte opposita visui aliquod visum, et ymaginemur duos visus
 aspicere illud visum et duos axes in simul coniungi in puncto
 superficiei visi in quo axis communis occurrerit superficiei illius
 230 visi, et hoc quidem possibile est in omni viso cuius situs ex
 duobus visibus est situs consimilis. Cum igitur duo axes fue-
 rint coniuncti in aliquo puncto axis communis, tunc duo axes, et
 axis communis, et linea que copulat duo centra foraminum
 duorum ossium, et due lineae extense in concavitatibus duorum
 235 nervorum omnia erunt in una superficie. Duo enim axes tran-
 seunt per centra duorum foraminum, transeunt enim per duo
 media concavitationum duorum nervorum in loco pyramidationis
 duorum nervorum. Cum igitur duo axes fuerint coniuncti in
 axe communi, erunt omnes in superficie in qua est axis com-
 240 munis, et linea secans ipsum que copulat centra foraminum
 duorum ossium. Et duo axes de loco centrorum duorum fora-
 minum usque ad punctum coniunctionis qui est in axe commu-
 ni erunt equales. Et positio eorum apud axem communem erit
 positio consimilis, et due partes duorum axium que sunt de
 245 centris duorum visuum usque ad punctum coniunctionis erunt
 equales, et remotio centrorum duorum visuum a foraminibus
 duorum ossium et a centris duorum foraminum est remotio
 equalis. Et etiam due partes duorum axium que sunt de su-
 perficiebus duorum visuum usque ad punctum coniunctionis
 250 etiam erunt equales. Nam due medietates dyametrorum sper-
 arum duorum visuum sunt equales, et quia ita est, positio
 puncti superficiei visi in quo coniuncti sunt duo axes apud duo
 puncta per que transeunt duo axes erit positio consimilis, et
 remotio eius ab eis erit equalis. Et hec duo puncta superficie-
 255 rum visuum sunt illa in quibus infigitur forma puncti in quo
 coniuncti sunt duo axes.

[2.14] Et etiam positio utriusque duorum punctorum que

227 *post visui scr. et del. o Er* 228 *aspicere: inspicere C1ErL3R* 229 *occurrerit:*
occurrat C1; occurrent Er 230 *visi inter. a. m. E/post et scr. et del. sic P1* 231 *igitur:*
ergo C1RS/fuerint (232): fiunt L3 234 *duorum¹ corr. ex duo a. m. Er/lineae inter.*
a. m. S 235 *omnia mg. a. m. C1* 236 *duorum rep. P1/duo om. EP3* 237 *con-*
cavitationum: concavitationem P1 238 *fuerint: fiunt L3; corr. ex fiunt a. m. C1* 239 *post*
communi scr. et del. e P1/axis corr. ex axa L3 240 *post et add. similiter R/ipsam:*
ipsam R/post ipsum add. axem EP3/foraminum duorum (241) transp. C1L3 241 *post*
ossium add. et duae lineae extensae in concavitatibus duorum nervorum R/loco corr. ex
locor L3 242 *coniunctionis corr. ex concavitationis L3/qui: que L3P1S; quod R*
 244 *que: qui P3/de: in P1* 245 *visuum: visibilium P3; corr. ex visibilium a. m. E*
 246 *post et inter. quia a. m. S/centrorum duorum transp. C1L3R* 250 *etiam om. R*
 251 *ita corr. ex ista P1* 252 *post puncti add. B scilicet EP3* 253 *post duo scr. et del.*
du P1/post et scr. et del. e Er 254 *post remotio scr. et del. ab S/equalis corr. ex ine-*
qualis L3 255 *quibus: que EP3/post forma scr. et del. in S/puncti corr. ex punctis*
a. m. E 256 *coniuncti sunt transp. P1S* 257 *que . . . punctorum (260) om. EP3*

sunt in duobus axibus superficierum duorum visuum apud
 260 concavitatem nervi communis erit positio consimilis, et positio
 istorum duorum punctorum apud quodlibet punctum in axe
 communi est positio consimilis. Ergo positio duorum puncto-
 rum que sunt in duobus axibus superficierum duorum visuum
 apud punctum axis communis qui est in medio concavitatis
 nervi communis in quo sunt coniuncte due linee exeuntes a
 265 centris duorum foraminum est positio valde consimilis et
 equalis. Et ambe forme que instituuntur in duobus punctis
 superficierum duorum visuum que sunt in duobus axibus, cum
 pervenerint ad concavitatem nervi communis, infigentur in
 puncto qui est in axe communi quod est in medio concavitatis
 270 nervi communis in quo linee sunt coniuncte, et efficientur una
 forma.

[2.15] Et cum due forme que sunt in duobus punctis que
 sunt in duobus axibus superficierum duorum visuum figuntur
 in puncto quod est in axe communi quod est in medio concavi-
 275 tatis nervi communis, forme que sunt in punctis circumdan-
 tibus utrumque duorum punctorum que sunt in duobus axibus
 superficierum duorum visuum infiguntur in concavitate com-
 munis nervi in punctis circumdantibus punctum quod est in
 axe communi. Et positio quorumlibet duorum punctorum
 280 superficierum duorum visuum quorum positio apud duo puncta
 posita in medio in duobus axibus duorum visuum est positio
 consimilis in parte et in remotione apud eundem punctum
 concavitatis nervi communis est positio consimilis. Et puncta
 quorum positio apud ipsa est positio consimilis erunt decli-
 285 nantia a puncto quod est in axe communi quod est in loco
 coniunctionis linearum ex concavitate nervi communis in parte
 ad quam ambo puncta que sunt in superficiebus duorum visu-

259 *post communis scr. et del. communis L3* 260 istorum duorum *transp. C1/duorum*
 punctorum *transp. P1/quodlibet corr. ex quolibet a. m. C1/post punctum scr. et del. in C1*
 261 duorum punctorum (262) *transp. S* 262 *que: qui P3* 263 punctum:
 positionem *P3 (mg.)/qui: que C1* 264 nervi communis *transp. ErP1S/coniuncte om.*
P1/due... exeuntes om. EP3 265 valde consimilis *transp. EP3* 266 pervenerint:
 perveniunt *EP3/nervi communis transp. C1ErL3RS/infigentur corr. ex infigentur S*
 269 *qui: quod R; corr. ex que S/in om. S* 270 nervi communis *transp. ErP1RS/*
efficientur: efficiuntur EP3; efficietur R 273 superficierum duorum *om. Er*
 276 utrumque *om. EP3/post utrumque add. SBX LYZ unumquodque EP3 (SBX LYZ alter.*
in RG VZ a. m. E)/que: qui C1L3 277 infiguntur: figuntur *C1; om. P1/communis*
 nervi (278) *transp. EP3* 281 posita *om. R/in² mg. a. m. C1* 282 eundem: idem *R*
 284 ipsa: ipsum *P1; ipsam R/est rep. L3/post est scr. et del. est C1/erunt declinantia (285):*
declinabunt R/declinantia (285) corr. ex declinabiles P1 285 *post est¹ scr. et del. est S*
 286 *ex inter. L3/post communis add. est positio consimilis EP1P3/parte: partem P1RS*
 287 *quam: quem ErP1*

um sunt declinantia, et remotio eorum ab ipso erit secundum
remotiones eorum a duobus axibus. Et due forme que infigun-
290 tur in duobus punctis que sunt consimilis positionis apud
superficies duorum visuum perveniunt ad illum eundum punc-
tum concavitatis communis ipsius nervi, et superponentur sibi
apud illum punctum, et efficientur una forma; et positio unius-
cuiusque punctorum superficiei visi que sunt in circuitu puncti
295 quod est in axe communi apud duos axes duorum visuum est
positio consimilis. Ergo forma cuiuslibet puncti eorum infige-
tur in duobus visibus in duobus locis consimilis positionis in
respectu duorum punctorum que sunt in duobus axibus super-
ficierum duorum visuum. Due igitur forme visi in quo coniuncti
300 sunt tres axes infiguntur in duobus mediis duarum superficie-
rum duorum visuum, et due forme puncti in quo sunt coniuncti
tres axes infigentur in duobus punctis que sunt in duobus axi-
bus superficierum duorum visuum, et quilibet punctus duarum
formarum infigetur in duobus locis consimilis positionis de
5 duobus visibus. Deinde due forme vise perveniunt ad concavi-
tatem communis nervi, et perveniunt due forme que sunt in
puncto quod est in duobus axibus ad punctum quod est in
communi axe, et efficientur una forma. Et quilibet due forme
que sunt in duobus punctis consimilis positionis a duobus
10 visibus perveniunt ad idem punctum punctorum circumdan-
tium punctum qui est in axe communi, et sic due forme totius
visi superponentur sibi et efficientur una forma, et sic visum
comprehendetur unum.

[2.16] Secundum ergo hunc modum due forme que infigen-
15 tur duobus visibus ab uno viso cuius positio in respectu duo-
rum visuum est consimilis efficiuntur una forma, et sic sentiens

288 sunt declinantia: declinant *R/post ipso scr. et del. erin P1* 289 duobus: duo-
rum *Er* 291 superficies: superficiem *EP3/perveniunt: pervenerint P1; perveniunt*
R/illum: illud P1RS; corr. ex illud P3/eundum: idem R 292 communis . . . nervi:
nervi communis *EP3/superponentur: supponentur P1S/sibi: illi R* 293 illum: illud
R/efficientur: efficietur R/uniuscuiusque (294): cuiusque unius C1; corr. ex uniusque
a. m. S; alter. ex unius cuius in unius cuiuslibet a. m. P3 294 circuitu *corr. ex circui-*
tui E 299 igitur: ergo *P1P3RS/visi corr. ex vise C1/coniuncti corr. ex coniuncte C1*
300 tres: duo *P3; mg. a. m. C1/post axes add. scilicet ab KL DB EP3 (DB: OB P3)/infiguntur*
alter. ex finguntur in figuntur C1 1 *post puncti add. sunt C1/sunt om. C1/sunt*
coniuncti transp. EP3 2 tres: duo *P3/post axes add. scilicet ab KB LB EP3 (KB: KL P3)*
3 quilibet: quodlibet *R; corr. ex quamlibet S/punctus: punctum R* 4 infigetur:
infigitur *P1; alter. in infigitur S/de: a P1S* 5 perveniunt: perveniunt *EP3* 6 com-
munis nervi *transp. C1L3R/que sunt inter. L3/post que add. etiam Er* 7 puncto . . .
est¹: punctis que sunt *C1* 8 efficiuntur: efficietur *R/due forme transp. EP3*
11 qui: quod *R* 12 superponentur: supponentur *P1/sibi: simul EP3/efficientur:*
efficietur R/visum: unum R 13 comprehendetur: comprehenditur *EP3/unum:*
visum S 14 ergo: igitur *C1ErL3* 15 viso: visu *L3* 16 efficiuntur: efficien-
tur *C1*

comprehendit unum visum, licet due forme infigantur ab eo in duobus visibus.

[2.17] Et cum due forme que sunt in duobus punctis que
 20 sunt in duobus mediis superficierum duorum visuum que sunt
 in duobus axibus pervenerint ad punctum quod est in axe
 communi, tunc quelibet due forme infixe in duabus superficie-
 bus duorum visuum infigentur in duobus punctis que sunt in
 duobus axibus, et pervenient semper ad illud idem punctum
 25 concavittatis nervi communis, quod est in communi axe. Nam
 duo puncta per que transeunt duo axes duorum visuum non
 mutantur, quoniam positio duorum axium apud duos visus
 semper est eadem positio non transmutabilis. Ergo punctus
 concavittatis communis nervi ad quem pervenient due forme
 30 que infiguntur in duobus punctis que sunt in duobus axibus
 superficierum duorum visuum semper est idem punctus, et est
 punctus qui est in communi axe in quo concurrunt due linee
 exeuntes a duobus centris foraminum duorum ossium exten-
 sorum in duobus mediis concavittatum duorum nervorum.
 35 Istud igitur punctum quod est in concavitate communis nervi
 quod est in communi axe vocetur centrum.

[2.18] Hoc igitur declarato, declaratum est quod forma
 cuiuslibet comprehensi quod comprehenditur ambobus visibus
 in cuius superficie puncto concurrunt axes duorum visuum
 40 infigitur in duobus locis superficierum duorum visuum que sunt
 duo media superficierum duorum visuum. Deinde iste due
 forme perveniunt a duobus visibus ad concavittatem communis
 nervi ad eundem locum, et superponuntur sibi, et efficiuntur
 una forma. Et due forme puncti in quo concurrunt duo axes ex
 45 viso infigentur in duobus punctis que sunt in duobus axibus
 superficierum duorum visuum, et ibunt ab istis duobus punctis

18 *post* duobus *add.* vi P3 20 mediis *corr.* ex visibus L3 21 duobus: duabus P3/
 pervenerint: perveniunt EP3/pervenerint . . . et (24) *om.* Er 22 tunc *alter.* in item
a. m. E 23 infigentur *om.* C1EL3P3R 24 et *om.* C1EL3P3R/semper: super Er/*post*
 illud *scr.* et *del.* et E/idem: commune P1S 26 *post* puncta *add.* concavittatis axis EP1P3
 (axis: ossis P1)/transeunt: pertranseunt C1 27 mutantur: mutatur P3/*post* visus *add.*
 non EP3 28 punctus: punctum R 29 communis nervi *transp.* C1L3/quem: quod
 R/perveniunt: perveniunt R 31 punctus: punctum R/et est punctus (32) *om.* L3
 32 punctus: punctum R/qui: quod R5 33 duobus *om.* P1 36 centrum *corr.* ex
 commune *a. m.* C1 37 igitur: ergo EP3 39 *post* visuum *scr.* et *del.* mihi P1; *add.*
 pervenit C1EL3P3 (*inter.* L3) 40 infigitur: in figura ErL3 (in *scr.* et *del.* L3); figura
 C1EP3; *alter.* in pervenit figura *a. m.* S 41 visuum *corr.* ex visibilium *a. m.* L3/*post*
 visuum *scr.* et *del.* que sunt duo media superficierum duorum S 42 perveniunt:
 proveniunt P1S/visibus *mg. a. m.* C1/communis nervi (43) *transp.* EP1P3 43 super-
 ponuntur: supponuntur P1S/efficiuntur: efficiunt P3; efficitur R 45 que . . . punctis
 (46) *mg. a. m.* S

ad punctum centri concavitatis communis nervi, et indifferen-
ter sive punctus in quo concurrunt duo axes fuerit in axe com-
muni sive extra. Sed tamen cum visum fuerit in axe communi
50 et duo axes concurrunt in puncto ipsius quod est in axe com-
muni, tunc due forme istius puncti erunt magis consimiles.
Remotiones enim istius puncti a duobus punctis in quibus
figuntur due forme istius puncti superficierum duorum visuum
(et sunt illa que sunt super axes) erunt equales, quoniam duo
55 axes in hac dispositione erunt equales in longitudine. Et simi-
liter quilibet punctus propinquus isti puncto cuius remotiones
a duobus punctis in quibus infiguntur sue forme sunt equales
quantum ad sensum, forme eius erunt magis consimiles quam
due forme visi quod est extra communem axem, quapropter
60 forma visi quod est in communi axe, cum fuerit fixa in con-
cavitate communis nervi, erit magis verificata. Sed cum visum
fuerit extra communem axem et remotio eius non fuerit maxi-
ma, tunc sue due forme que infiguntur in duobus visibus non
maxime differunt, quapropter forme eius que infiguntur in
65 concavitate nervi communis non erunt due.

[2.19] Cum autem visum fuerit extra communem axem et
maxime fuerit remotum ab ipso, et cum hoc axes duorum visu-
um concurrunt in aliquo puncto ipsius, tunc forma eius infige-
tur in concavitate communis nervi una forma, et forma puncti
70 eius in quo duo axes concurrunt infigetur in puncto centri. Sed
tamen forma eius non erit verificata sed dubitabilis. Forma
igitur puncti visi in quo duo axes concurrunt infigetur in omni-
bus dispositionibus in puncto centri concavitatis communis
nervi, sive punctus concursus fuerit in communi axe, sive extra

47 communis nervi *transp.* EP3/et *om.* C1 48 punctus: punctum R/fuerit: fuerint
C1EErL3P3 50 concurrunt: concurrerint ErRS; concurrent P1/post puncto *scr. et del.*
in puncto P3 52 istius: huius EP3 53 istius: illius P1S 55 dispositione *corr.*
ex positione Er 56 quilibet . . . propinquus: formae cuiuslibet puncti propinqui R
57 infiguntur: figuntur EP3/sue: due EP3/sue forme *transp.* C1L3R 58 forme eius
om. R/eius: cuiusmodi EP3/post consimiles *scr. et del.* forme cuius erunt magis consimi-
les E 59 post forme *scr. et del.* erunt consimiles c P1/visi . . . forma (60) *om.* P1/
communem axem *transp.* EP3 60 fixa: infixia C1EP3R 61 communis nervi *transp.*
P1/verificata: certificata C1L3R/sed: et P1S 62 communem axem *transp.* EP3/eius
om. L3R; *mg. a. m.* C1 63 sue *mg. a. m.* C1/que: qui P3/post duobus *scr. et del.* non
ma P1 64 differunt: different R 65 erunt *om.* P3 66 autem: vero R/visum
corr. ex visus S 67 cum hoc *om.* R/axes: axis C1Er 68 concurrunt: concurrerint
L3P1P3R; *alter. in* concurrerint a. m. E/ipsius: illius C1/infigetur (69) *om.* EP3
69 communis nervi *transp.* EP3 70 infigetur: infiguntur EP3; infiguntur ErL3; *corr.*
ex infiguntur C1/post puncto add. communis C1R/post centri add. communis EP3 (mg.
a. m. E) 71 eius non *transp.* P3/erit *om.* P3/verificata *corr. ex verificata Er* 72 igitur:
ergo S/duo *om.* C1; *mg. a. m.* L3/duo axes concurrunt: concurrunt duo axes EP3
74 punctus: punctum R/concursus: occurus C1; communis P1; *corr. ex occurus L3*

75 illum. Quod autem remanet de forma visi infigetur in circuitu
puncti centri. Si autem visum fuerit minimi corporis et propin-
quorum dyametrorum et fuerit in communi axe vel prope, tunc
forma eius infigetur in concavitate communis nervi una forma;
et cum hoc est verificata, et positio cuiuslibet puncti eius apud
80 duos visus est positio consimilis, ut prius declaravimus. Si
vero visum fuerit magni corporis et remotorum dyametrorum, et
cum hoc fuerit in communi axe, tunc forma illius partis que est
apud locum coniunctionis duorum axium que circumdat punc-
tum coniunctionis infigetur in communi nervo una forma, et
85 verificata. Et forma residuarum partium infigetur continua
cum forma istius partis, quapropter forma totius visi figetur
una in omnibus dispositionibus; sed forma extremorum et illo-
rum que remota sunt a puncto concursus erit non certificata,
quoniam non omnes puncti remoti a puncto concursus figentur
90 sue forme in duobus punctis consimilis positionis in respectu
amborum visuum in fine consimilitudinis. Sed forma cuiuslibet
puncti remoti a puncto concursus figetur in duobus punctis
amborum visuum quorum positio apud duos visus est positio
consimilis in parte, et forte consimilis in remotione a duobus
95 axibus et forte non consimilis in remotione a duobus axibus.
Forme autem eorum quorum remotio non est consimilis figentur
in concavitate communis nervi in duobus punctis obliquis a
centro in una parte, sed erunt due; et si visum fuerit unius col-
oris, tunc illud fere nichil operabitur in ipsum propter consimi-
100 litudinem coloris et ydemptitatem forme. Si autem visum
habuerit diversos colores, aut fuerit in eo lineatio, aut pictura,
aut subtiles intentiones, tunc illud operatur in ipsum, qua-

75 autem om. P1/post forma add. a P1S (scr. et del. P1)/visi: visu S; corr. ex visu P1
76 propinquorum (77): propinquarum R; propinquiorum S 78 forma¹ om. P1/
communis nervi transp. C1L3 79 cum hoc om. R/est: etiam EP3; om. ErRS; inter. L3/
post est scr. et del. verfic P1/verificata corr. ex verificata Er/et² om. Er; inter. L3/post positio
add. eius Er/puncti om. P3 81 remotorum: remotiorum EP3; remotarum R
82 cum hoc: etiam R; corr. ex hoc cum L3 83 que: qui E 85 verificata corr. ex
verificata Er 86 istius: illius EP3/totius corr. ex istius S/figetur: infigetur P1P3RS
87 in om. EEerL3P3; inter. a. m. C1/post sed add. tamen P1RS/et: etiam EP3/illorum (88):
illo Er 88 erit. . . concursus (89) mg. a. m. E 89 non om. EP3R; inter. L3/omnes:
omnis ErP1RS/puncti remoti: punctus remotus P1S/post remoti scr. et del. p P1/figentur:
infigentur P3; alter. in infigentur a. m. E 90 sue: duae R; corr. ex due Er 93 quorum
corr. ex quo P3/est om. P3/post est scr. et del. positio E 96 autem: aut P3/figentur:
figetur P3 97 communis nervi transp. C1L3 98 sed: et R 99 illud: istud
C1L3R/fere om. P1/operabitur: operabatur C1L3; operatur EP3 100 coloris om. P3;
inter. a. m. E/ydemptitatem: ydemptitate L3/ante forme scr. et del. for L3/visum om. P1
101 habuerit: fuerit habens EP3/diversos: duos P1S/eo: ea C1ErL3; ipso EP3/aut²:
apud L3 102 tunc: inter P3/illud: istud C1ErL3R/operatur: operabitur C1; operatuatur
Er/quapropter (103): quoniam L3; corr. ex quoniam a. m. C1

propter forma extremorum erit dubitabilis, non certificata.

[2.20] Et cum visum fuerit magni corporis et remotorum
 105 dyametrorum, et axes amborum visuum fuerint fixi in aliquo
 puncto eius et immobiles, tunc forma eius apparet una, et lo-
 cus concursus eius et illud quod ei vicinatur erunt certificata et
 indubitabilia. Extrema autem et illa que eis vicinantur erunt
 non certificata propter duas causas: quarum una est quia
 110 extrema comprehenduntur per radios remotos ab axe, qua-
 propter non bene erunt manifesta; secunda autem est quia non
 forma cuiuslibet puncti eius constituitur in concavitate com-
 munis nervi in uno puncto, sed quedam sunt quorum forma
 constituitur in duobus punctis non in uno. Cum igitur duo axes
 115 fuerint moti super omnes partes huius visi, tunc verificabitur
 forma eius. Si autem visum fuerit extra axem communem et
 remotum ab ipso, tunc forma eius non erit certificata, positio
 enim cuiuslibet puncti illius apud ambos visus non est positio
 consimilis propter inequalitatem remotionum puncti huius visi
 120 a duobus punctis superficierum duorum visuum in quibus in-
 stituuntur due forme eius et a duobus axibus. Cum igitur ambo
 visus obliquabuntur ad huiusmodi visum adeo quod axis
 communis veniat ad istud visum aut prope, tunc certificabitur
 forma eius.

125 [2.21] Et similiter cum ambo visus comprehenderint multa
 visa in simul et axes amborum visuum simul concurrerint in
 aliquod unum visorum illorum et fixi fuerint in illo, residua
 autem visa fuerint extra duos axes, et visum in quo concur-
 rentes sunt duo axes fuerit minimi corporis, tunc forma visi in
 130 quo concurrentes sunt duo axes in concavitate nervi communis

103 forma extremorum *transp. C1ErL3R/post* forma *add. exterior P3/non om. P3/*
 certificata: certificatam *Er* 104 corporis *corr. ex coloris a. m. E/remotorum: remota-*
 rum *R* 106 *post et¹ add. fuerint EP3* 107 vicinatur: propinquum est *R*
 108 autem: aut *P3/illa: illud L3; corr. ex illud C1/eis vicinantur transp. ErP1RS: vicinantur:*
 vicina sunt *R* 109 propter *inter. E/una: unum C1L3/quia: quod C1L3R*
 110 comprehenduntur: comprehendantur *R/quapropter (111): que propter Er*
 111 autem *om. R/post autem scr. et del. non L3* 112 constituitur: instituitur *R*
 114 constituitur: instituitur *C1ErL3R; alter. in instituitur a. m. S/in¹ corr. ex a a. m. C1/*
 igitur: ergo *C1R* 115 huius: huiusmodi *C1L3/verificabitur: certificabitur R*
 116 eius *om. P3* 117 eius *om. S/positio: propter P1* 118 enim: autem *EP3/illius:*
 eius *P1S* 119 huius: huiusmodi *C1* 120 punctis *corr. ex visibus P1/duorum om.*
P3/instituuntur (121): constituuntur L3 121 due... eius: forme... due *C1L3/igitur:*
 ergo *C1* 122 quod: ut *R* 123 istud: istum *C1L3; illud EP3/certificabitur... eius*
 (124): forma... certificabitur *EP3* 126 in¹ *om. R/et... simul om. L3/post amborum*
scr. et del. in P1/simul² om. C1P1/concurrerint: concurrerent L3 127 visorum *corr. ex*
visu S/visorum illorum transp. EP3/fixi fuerint transp. P1RS 128 concurrentes sunt
 (129): concurrunt *R* 129 fuerit: sit *C1P1S; fuerint EE; corr. ex fue-*
 rint *P3* 130 concurrentes sunt: concurrunt *R*

erit una forma et certificata. Et si visum fuerit super axem communem, tunc forma eius erit magis certificata quam forma visi que est extra axem communem. Et si in ipso sunt concurrentes duo axes, visa autem que comprehenduntur a visu in illo statu que sunt propinqua viso in quo duo axes sunt concurrentes—sed cum hoc fuerint minimi corporis—forma eius instituitur in concavitate communis nervi una in qua non erit dubitatio maxima, nam forma eius erit propinqua centro. Quod autem illorum visorum que comprehenduntur a visu in illo statu fuerit remotum a visu in quo sunt concurrentes duo axes forma eius instituetur in concavitate istius nervi dubitabilis. Et tunc aut erunt due forme et erunt se adinvicem penetrantes, quia sunt in una parte, quapropter inequalitas que est inter suas positiones in remotione non erit maxima, unde due forme erunt se penetrantes, aut forma quarumdam partium erit duplex, et forma quarumdam erit una. Et sic forma huiusmodi visibilium erit dubitabilis in omnibus dispositionibus propter diversitatem positionis radiorum exeuntium ad illud et quia radii exeuntes ad illud erunt remoti a duobus axibus. Forma autem obliqui visi a duobus axibus remoti a loco concursus duorum axium erit non certificata, dum fuerit remota a concursu duorum axium. Cum autem duo axes fuerint remoti et concurrentes in ipso, tunc verificabitur forma eius.

[2.22] Cum axes duorum visuum concurrerint in aliquo viso, et cum hoc duo visus comprehenderint aliud visum propinquius duobus visibus in quo viso sunt concurrentes duo axes aut remotius, et fuerit cum hoc inter duos axes, tunc positio eius apud duos visus erit diversa in parte. Nam cum fuerit inter duos axes erit dextrum unius axis et sinistrum alterius, et

131 una forma *transp.* C1/visum *corr.* ex visus C1L3 (*a. m.* C1) 133 sunt: sint P1S/sunt concurrentes (134): concurrunt R 134 visa: visorum R 135 sunt concurrentes (136): concurrunt R 136 sed: si C1EL3P3R/cum hoc: etiam R/hoc *om.* P1/fuerint: fuerit P3/post fuerint *add.* ipsa R/eius: cuiusque P1S; *om.* R 137 communis nervi *transp.* C1L3/una in qua: in qua una P3 138 post centro *add.* communi C1/quod . . . visorum (139): ex illis autem visibilibus R/autem illorum (139) *transp.* P3 139 illo: isto R/post statu *add.* quod R 140 viso: visu Er/sunt concurrentes: concurrunt R/forma eius *transp.* R 142 et erunt *om.* R/adinvicem: mutuo R/quia *corr.* ex quare *a. m.* Er 143 positiones: dispositiones P1; *corr.* ex opiniones L3 144 erunt . . . penetrantes (145): se mutuo penetrabunt R 145 partium . . . quarumdam (146) *inter.* L3/erit *mg.* *a. m.* C1 146 visibilium *om.* P1 148 illud: illa R/et *om.* P3/radii: illi P3 149 illud: illa R 150 a² *om.* P1 151 axium (152) *corr.* ex auxium P3 152 concurrentes: concurrerint R 153 verificabitur: vertificabitur S 154 post cum *add.* autem ErP1RS; *add.* duo C1R (*mg.* *a. m.* C1)/concurrerint: concurrunt EEerP3 155 viso: visu Er; *corr.* ex visu P3/cum *om.* R/hoc: hi R/visus *corr.* ex axes L3/aliud: alium P1 156 in . . . concurrentes: viso in quo concurrunt R 157 cum hoc: etiam R; *transp.* P1/tunc . . . axes (159) *mg.* *a. m.* E 158 visus: axes P3/fuerit: fuerint C1

160 radii exeuntes ad ipsum ab altero viso erunt dextri ab axe, et
qui exeunt ad ipsum a reliquo viso erunt sinistri; et sic positio
eius apud duos visus erit positio diversa in parte. Et forma
huiusmodi visorum instituitur in duobus visibus in duobus
165 locis diverse positionis, et due forme eius que instituuntur in
duobus visibus perveniunt ad duo loca diversa concavitarum
communis nervi, et erunt a duobus lateribus centri, quapropter
erunt due forme, et non superponentur sibi.

[2.23] Et similiter cum fuerit visum in altero axe et extra
reliquum forma eius instituetur in concavitate communis nervi
170 in duobus locis, una scilicet in centro et alia obliqua a centro,
et non superponentur sibi.

[2.24] Secundum igitur hos modos instituetur forma visibi-
lium in duobus visibus et in concavitate communis nervi.

[2.25] Omnia autem ea que diximus sic possunt experiri
175 experimento cum quo veniet certificatio.

[2.26] Accipiat tabula lenis ligni cuius longitudo sit uni-
us cubiti et cuius latitudo sit quattuor digitorum, et sit bene
plana, et equalis, et lenis. Et sint fines sue longitudinis equidis-
tantes et sue latitudines equidistantes, et sint in ipsa duo
180 dyametri se secantes a quorum loco sectionis extrahatur linea
recta equidistans duobus finibus longitudinis. Et extrahatur a
loco sectionis etiam linea recta perpendicularis super lineam
primam positam in medio, et intingantur iste linee tincturis
lucidis diversorum colorum ut bene appareant, sed tamen duo
185 dyametri sint unius coloris. Et concavetur in medio latitudinis
tabule apud extremum linee recte posite in medio, et inter duos
dyametros, concavitate rotunda, et cum hoc quasi pyramidali
tantum quantum poterit intrare cornu nasi quando tabula su-

160 *post ab¹ scr. et del. ipso P1* 161 *post exeunt rep. ad (160) . . . exeunt (161) L3/a*
reliquo: in aliquo P3/et . . . eius (162) *scr. et del. L3* 162 *post eius rep. erit (158) . . . eius*
(162) *EL3P3 (scr. et del. L3)/positio om. R* 163 *post visorum scr. et del. instituitur Er*
164 *eius om. R* 165 *perveniunt: pervenient R* 166 *et erunt om. P1/post centri*
add. communis C1 167 *superponentur: supponerentur P1; supponentur S*
168 *et² om. P3* 170 *et om. P1/aliam . . . centro rep. P1/obliqua: aliqua Er* 171 *super-*
ponentur: supponentur P1S 172 *igitur: ergo R* 173 *communis nervi transp. P1*
174 *ea om. R; inter. E/que om. S/experiri: experimentari R* 175 *ante cum scr. et del.*
cum S 176 *sit om. P1S* 177 *cubiti: cubi P1/cuius om. C1/sit inter. P1*
178 *plana: plena P3/sint: ut S/sint . . . longitudinis: fines sue . . . sint L3/longitudinis:*
latitudinis Er 179 *et . . . equidistantes rep. L3/latitudines alter. in latitudinis a. m. C1/*
ipsa: ipso C1L3 180 *se rep. C1/quorum: quarum R* 181 *ante a add. etiam R*
182 *etiam om. R/post linea add. sectionis P3/lineam primam (183) transp. ErP1S*
183 *positam: posita C1* 184 *colorum om. P1/duo: duae R* 185 *concavetur: fiat*
cavatura R/post latitudinis add. et L3 186 *et om. C1/duos: duas R* 187 *cum hoc*
om. R/quasi om. P3/pyramidali: pyramidaliter P1RS 188 *quantum poterit: sicut*
possit R/cornu: conus EP3; corr. ex conu L3/superponetur (189): supponitur P1;
supponetur S

perponetur illi quousque tangent duo anguli tabule fere duo
190 media superficierum duorum visuum, tamen non tangent.

[2.27] Sit igitur tabula in figura **ABCD** et dyametri **AD** [et]
BC, et punctus sectionis sit **Q**; et linea extensa in medio longi-
tudinis sit **HQZ**, et linea secans hanc lineam secundum angulos
rectos sit **KQT**. Et concavitas que est in medio latitudinis ta-
195 bule sit illa que continetur a linea **MHN**.

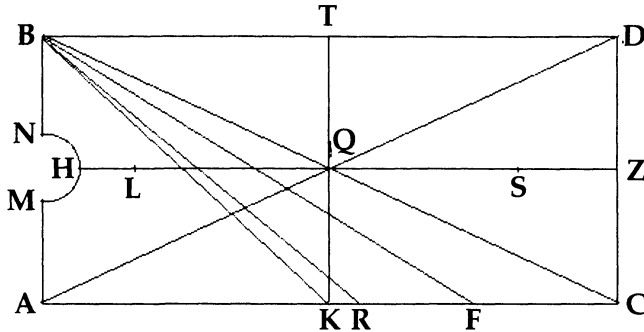


figure 3.8

[2.28] Hac igitur tabula facta hoc modo, accipiatu cera alba
ex qua fiant tria individua parva columpnata, et intin-
gantur diversis coloribus; et erigatur unum individuorum in
medio tabule in puncto **Q**, et applicetur tabule adeo quod non
200 possit auferri a suo loco, et sit stans super tabulam statu
equali. Duo autem individua reliqua erigantur super extrema
linee late in duobus punctis **K**, **T**, et sic tria individua erunt in
una verticatione. Et hoc quidem facto, eleuet experimentator
hanc tabulam, et superponat concavitatem que est in medio
205 longitudinis cornu nasi et inter oculos adeo quod cornu nasi
intret concavitatem et applicetur cum tabula, et fient duo an-
guli tabule apud duo media superficierum duorum visuum et
propinqui ut tangent ipsa fere. Deinde experimentator debet
inspicere individuum propositum in medio tabule et pupillam
210 super ipsum tenere fortiter. Cum igitur experimentator inspex-

189 tangent: tangent R 190 post visuum scr. et del. tangent P1/tamen: quamvis R
191 sit: si P1/post dyametri add. sint ErP1S 192 BC transp. L3/punctus: puncta P1S
193 ante sit scr. et del. i P1/HQZ: HQ P3/post linea scr. et del. i P3/hanc corr. ex habent
a. m. Er 194 sit om. Er/concavitas: cavitas P1S/latitudinis: longitudinis P1S
197 tria om. P1S/parva rep. Er/ante et add. vel columpnaria C1/intingantur (198) corr. ex
infigantur EP3 (a. m. E) 199 quod: ut R 200 a: in P1 202 post lineae add.
latitudinis C1; scr. et del. in duobus p P1 203 post facto scr. et del. quidam C1
204 hanc om. P1/concavitatem: concavitate P3 205 quod: ut R 207 et scr. et
del. C1 208 ipsa fere transp. L3/post ipsa scr. et del. re C1/fere om. P1; mg. a. m. C1;
inter. ErL3S (a. m. ErS) 209 post individuum scr. et del. duum P1/propositum:
positum C1 210 ipsum: ipsam P1S

erit individuum positum in medio hoc modo, axes duorum visuum concurrent in hoc individuo et superponentur duobus dyametris aut erunt equidistantes illis. Et erit axis communis, quem prius determinavimus, superpositus lineae extense in medio longitudinis tabule que est linea **HZ**.

[2.29] Deinde experimentator in hac dispositione debet intueri omnia que sunt in superficie tabule. Tunc autem inveniet unumquodque trium individuorum que sunt in punctis **K**, **Q**, **T** unum, et inveniet lineam **KQT** etiam unam. Linea autem **HZ** extensa in longitudine tabule invenietur due se secantes apud individuum positum in medio. Et similiter duo dyametri etiam, cum experimentator intuetur eos in hoc statu, invenientur quattuor, utrumque eorum scilicet duo.

[2.30] Deinde experimentator debet ponere pupillam circa alterum individuorum que sunt in duobus punctis **K**, **T** ut duo axes concurrant in individuo posito in extremo. Deinde intueatur etiam in hac dispositione, et inveniet trium individuorum unumquodque unum et lineam positam in latitudine etiam unam, et inveniet lineam mediam extensam in longitudine tabule duas et utrumque dyametrorum duos.

[2.31] Cum igitur experimentator comprehenderit has lineas et individua posita super tabulam, et auferet duo individua que sunt in duobus punctis **K**, **T**, et ponat ea super lineam **HZ** extensam in longitudine, unum scilicet in puncto **L**, quod sequitur visum, et reliquum in puncto **S**, quod est ultra individuum positum in medio. Deinde revertat tabulam ad suam primam positionem et dirigat pupillam ad individuum positum in medio. Tunc autem inveniet duo individua quattuor et obliqua

211 positum: propositum *P1S/post* modo *add. inter. C1EErL3P3/axes alter. in inter axes a. m. S* 212 ante in *add. axes C1; inter. axes duorum visuum L3/duobus: duabus R*
 213 illis *om. P1S* 214 quem: quam *P3* 217 omnia . . . sunt *corr. ex que . . . omnia S* 218 individuorum *corr. ex individuum L3* 219 etiam: et *Er; scr. et del. E; om. P3/post* unam *add. lineam C1/linea corr. ex lineam L3* 220 invenietur: invenientur *P1R; corr. ex invenientur L3P3/post* due *scr. et del. tabule P3* 221 duo: duae *R*
 222 eos: eas *R/invenientur (223): apparebunt R; corr. ex invenientur L3* 223 utrumque: uterque *E; utraque R/eorum: earum R/eorum scilicet transp. ErP1S/duo: duorum P1; duplex R* 224 deinde . . . individuorum (225) *om. P1/experimentator om. Er/circa alter. in contra a. m. C1* 225 *KT corr. ex ET a. m. E* 226 axes *corr. ex axex L3/in om. S/in* individuo *corr. ex individuum L3* 227 etiam: et *L3; om. P1* 228 unumquodque: unumquodquod *S/unum mg. L3* 230 ante duas *scr. et del. ta Er/utrumque: utramque R; corr. ex utrum a. m. C1/duos: duas R* 232 et² *mg. a. m. C1; inter. L3; om. EP3R/auferet: auferet R* 233 *K corr. ex Q Er/KT corr. ex ET a. m. E/lineam: lineas L3*
 234 longitudine *corr. ex longitudinem E/L inter. L3/post L add. secundum L3*
 236 revertat: revertatur *C1; vertet P1; vertat R* 237 post pupillam *add. etiam Er*
 238 post quattuor *scr. et del. et obliqua in dextro et duo C1*

240 a medio, duo scilicet in dextro et duo in sinistro, et inveniet ea
super duas lineas que in rei veritate sunt una linea in medio,
sed apparent due; et inveniet quolibet duorum quattuor super
alteram duarum linearum.

[2.32] Et similiter si abstulerit duo individua ab hac linea
et posuerit ea super alterum duorum dyametrorum, unum in
245 parte visus et reliquum ultra individuum positum in medio,
inveniet illa quattuor. Nam uterque dyametrorum apparebit
duo, quapropter apparebunt super utramque linearum que
sunt unius dyametri in rei veritate duo individua unum in parte
visus et aliud ultra individuum positum in medio. Et similiter
250 si posuerit duo individua super ambos dyametros, utrumque
super alterum dyametrum, et posuerit ea in parte visus, inveni-
et illa quattuor, duo propinqua et duo remota.

[2.33] Deinde experimentator debet auferre duo individua
a tabula et ponere alterum eorum super marginem tabule ultra
255 punctum **K** et prope ipsum valde, ut super punctum **R**, et re-
vertatur tabula ad suam primam positionem, et dirigat pupil-
lam ad individuum positum in medio. Tunc quidem inveniet
individuum positum in puncto **R** unum. Deinde auferat indi-
viduum a puncto **R**, et ponat ipsum in margine tabule etiam
260 ultra punctum **K** super punctum remotum a puncto **K**, ut
super punctum **F**, et dirigat pupillam ad individuum positum
in medio, quoniam tunc inveniet individuum positum apud
punctum **F** duo.

[2.34] Experimentator autem inveniet omnia que diximus
265 cum direxerit pupillam ad individuum positum in medio, aut
ad individuum positum in linea recta in latitudine, aut ad
punctum illius lineae, quodcumque punctum sit, et dum duo
axes sunt concurrentes in individuo posito in medio aut in

239 scilicet . . . duo *mg. a. m. C1* 240 rei *om. P15* 241 inveniet *corr. ex* invenient
C1/duorum: duo horum P1R5/super . . . ea (244) mg. a. m. E 244 ea: illa *ErP15/*
alterum: alteram P3R/duorum: duarum R/duorum dyametrorum transp. C1EL3R
245 reliquum *corr. ex* reliqua *L3/individuum corr. ex* dividuum *L3* 246 inveniet:
invenit E/post illa scr. et del. qua C1/uterque: utraque R 247 duo: duplex *R*
250 ambos: ambas *R/post utrumque add. scilicet Er* 251 alterum: alteram *R/posuerit*
om. P1S/ea in transp. R/post visus add. posuerit P1S 253 duo: due *P3* 254 mar-
ginem: ymaginem *P3* 255 *K corr. ex E a. m. E/R: K EP3* 257 in medio *om. P3/*
quidem om. R 258 puncto: punctum *EP3/R: K EP3; X P1/deinde auferat transp.*
C1L3/auferat corr. ex auferant *P1* 259 *R: K C1EP3/margine: ymagine P3* 260 *K¹:*
R ErL3S; X P1 261 *post super scr. et del. ipsum P3/punctum F transp. P1S*
262 quoniam: quia *P1S/apud: aliud P1: in R; ad S* 263 punctum: puncto *R*
264 inveniet: inveniat *ErL3* 265 in . . . positum (266) *om. P1; mg. a. m. C1* 266 ad¹
om. L3 267 illius: unius *R/quodcumque: quocumque P1/punctum² om. R/post sit*
scr. et del. aut individuum positum C1 268 sunt concurrentes: concurrunt *R/in¹*
om. C1Er

270 aliquo puncto lineae posite in latitudine. Si ergo experimentator
direxerit pupillam in illo statu ad individuum positum extra
lineam positam in latitudine aut ad punctum positum extra
illam lineam, et concurrerint duo axes in aliquo puncto extra
lineam positam in latitudine, tunc individuum positum in
275 medio videbitur duo. Et si reliqua individua fuerint in duobus
punctis **K**, **T**, tunc uterque eorum etiam videbitur duo. Deinde
cum experimentator direxerit pupillam ad medium individuum
aut ad aliquem locum lineae posite in latitudine, statim dispositio
revertetur, ut in prima figura.

[2.35] Igitur a puncto **B** extrahantur lineae **BK**, **BR**, **BF**. Linea
280 igitur **KB** est maior linea **BT**, et linea **KQ** est equalis **QT**.
Sic angulus **TBQ** est maior angulo **QBK**.

[2.36] Et angulus **TBQ** est equalis angulo **KAQ**. Ergo angulus
KAQ est maior angulo **KBQ**.

[2.37] Ergo remotio lineae **AK** ab axe **AQ** est maior quam
285 remotio lineae **BK** ab axe **BQ**. Sed differentia inter has duas
remotiones est modica, differentia enim inter duos angulos
KAQ, **KBQ** est parva.

[2.38] Et individuum quod est apud punctum **K** semper
videtur ambobus visibus unum quando duo axes fuerint concurrentes
290 in individuo quod est apud punctum **Q**. Et due lineae
AK, **BK** sunt equidistantes duobus radiis exeuntibus ad individuum
quod est apud punctum **K**, dum duo axes concurrerint in individuo
quod est apud punctum **Q**.

[2.39] Et similiter dispositio individui quod est apud
295 punctum **R** scitur, quoniam radii exeuntes ad ipsum erunt in

269 ergo om. P3 270 direxerit: dixit Er; direxerat P1/statu: situ R 271 ante aut
scr. et del. ad P1 272 illam lineam transp. P1R/concurrerint: concurrent Er;
concurrerunt P3 274 post et si inter (??). L3/fuerint: sunt C1L3 275 tunc om. P3/
uterque: utrumque R 276 cum: si P1S 277 aut corr. ex aliud L3/ad om. S/
dispositio (278) corr. ex positio P3 278 ut om. ErS 279 a: ab S/puncto om. P1;
inter. a. m. S/B om. S/BR: BT P1; corr. ex RB Er 280 igitur: ergo P1S/est maior rep.
P3/KQ corr. ex KI P1/post equalis add. lineae P1S 281 post sic add. igitur R/angulus
corr. ex angulos a. m. Er/QBK: KBQ C1/post QBK add. per 4p geometriae Jordani. In
triangulo enim BTK ab angulo TBK, inaequalibus lateribus BT, BK comprehenso, recta
BQ est in medium basis TK: itaque angulus QBK ab ipsa BQ et maiore latere BK
comprehensus, minor est angulo TBQ, ab eadem BQ et minore latere BT compre-
henso R 282 angulus (283) om. C1 283 KAQ corr. ex KAC P1/post KAQ inter.
que est equalis angulo QBT L3 284 post ergo scr. et del. t S 285 BQ corr. ex BK
P1/has inter. P1 286 modica: in media P1 288 est om. P1 289 duo om. R;
inter. C1L3/axes fuerint transp. P3/fuerint concurrentes (290): concurrerint R 290 in
inter. ErS 291 post AK add. et C1/sunt alter. in sint S 292 apud punctum corr. ex
punctum apud L3/punctum om. P1S/post K scr. et del. Q S/dum: cum C1EErL3
293 individuum: individuo R/punctum om. R/punctum Q transp. P1S 294 et om.
R/dispositio rep. Er/post individui scr. et del. quod est P3 295 punctum om. P3/ad:
apud ErP1

verticatione duarum linearum **AR**, **BR**, et videbitur unum.

[2.40] Et duo anguli **RAQ**, **RBQ** non maxime differunt, et angulus **KBR** non habet sensibilem quantitatem quando punctus **R** fuerit valde propinquus puncto **K**.

300 [2.41] Declarabitur igitur ex hac dispositione quod visum cuius positio apud duos axes est una positio in parte et remotio radiorum exeuntium ad ipsum a duobus visibus non est maxime differentie, illud visum videbitur duobus visibus unum.

5 [2.42] Anguli autem **FAQ**, **FBQ** sunt diversi diversitate maxima, et individuum quod est apud punctum **F** videbitur duo quando duo axes concurrerint in individuo quod est apud punctum **Q**.

10 [2.43] Declarabitur igitur ex hac dispositione quod visum ad quod positio radiorum exeuntium a duobus visibus est diversa in remotione a duobus axibus maxima diversitate videtur duo, etsi positio eius in respectu duorum axium est eadem positio in parte.

[2.44] Positio autem lineae **HQZ** in respectu axium duorum
15 visuum est positio diversa in parte, radii etenim exeuntes ad partem **HQ** a dextro visu sunt sinistri ab axe **AQ**, radii autem exeuntes ad hanc partem a sinistro visu sunt dextri ab axe **BQ**. Radii vero exeuntes ad partem **QZ** a dextro visu sunt dextri ab axe **AQ**, et radii exeuntes ad ipsam a sinistro visu sunt sinistri
20 ab axe **BQ**, et radii qui exeunt ad ipsam sunt diverse positionis in parte. Et omnis punctus istius lineae remotio duorum radiorum exeuntium ad ipsum a duobus visibus a duobus axibus est equalis; et ista linea et omnia posita super ipsam preter individuum positum in medio semper videntur duo cum

296 **AR**, **BR**: **AT**, **BT** *P1/post AR add. et C1* 297 **RAQ**: **RA** que *P1/post RAQ add. et C1/et²: etiam ErL3; alter. ex etiam in cum a. m. C1* 298 **KBR**: **KBT** *P1/quando: quoniam L3/punctus (299): punctum R* 299 **R**: **T** *P1/propinquus: propinquum R* 300 igitur *corr. ex ergo S* 1 positio¹: dispositio *R; om. P3/remotio (2): remotiones P1S* 2 est *om. ErP1S* 3 differentie: differunt *ErP1; differens R; alter. ex differant in differunt S* 5 autem *om. P3* 6 maxima: magna *Er/apud corr. ex a. m. S/post apud scr. et del. F P3* 7 quando: quoniam *R/concurrerint: concurrent R/in om. Er* 9 igitur *om. P3* 10 visibus... duobus (11) *inter. L3* 11 maxima diversitate *transp. P3/diversitate corr. ex diversa P3* 12 videtur: videbitur *C1L3/etsi: licet R/est om. L3/est eadem transp. EP3R* 14 **HQZ** *corr. ex HQR L3/axium... visuum (15) corr. ex duorum... axium C1* 16 partem *corr. ex partes C1/post AQ add. et C1P1S/autem om. C1P1S* 17 ad: ante *C1/post partem add. HQ C1P1S/BQ... axe (19) mg. a. m. E* 18 vero: autem *P3/QZ corr. ex ZQ P1* 19 ante et *scr. et del. ve S/post ipsam add. QZ C1/sunt inter. a. m. Er* 20 qui: que *L3/ipsam: ipsum R* 21 omnis... lineae *om. R/post omnis scr. et del. omnis P3/istius: illius P1S* 22 post ad *add. quodlibet punctum illius lineae R/ipsam: ipsam P3; om. R* 24 positum: positionum *S*

25 duo axes concurrerint in individuo posito in medio.

[2.45] Declaratum est igitur ex hac dispositione quod visum cuius positio in respectu duorum axium est diversa in parte semper videtur duo, etsi remotiones radiorum exeuntium ad ipsum a duobus visibus a duobus axibus sunt equales. Remotiones enim quorumlibet duorum radiorum exeuntium a duobus visibus ad aliquod punctum eius erunt in duabus partibus diversis, quapropter due forme cuiuslibet puncti eius instituentur in duobus punctis concavitatis communis nervi a duobus lateribus centri.

35 [2.46] Et similiter etiam est dispositio utriusque dyametrorum, scilicet quoniam radii exeuntes ad utrumlibet eorum a visu sequente ipsum erunt a medio visus, et propinqui axi, et sub axe, et supra axem; et radii exeuntes ad ipsum a reliquo visu erunt declinantes a reliquo axe. Qui vero a dextro visu ad 40 sinistrum dyametrum erunt sinistri ab axe; qui autem exeunt a sinistro visu ad dextrum erunt dextri ab axe. Forme quidem dyametrorum istorum et omnia etiam posita super ipsos videntur duo preter individuum positum in medio quando duo axes concurrerint in medio individuo.

45 [2.47] Declarabitur igitur ex hoc quod visum quod in respectu alterius visus est oppositum medio eius, in respectu autem reliqui est obliquum a medio, videtur duo. Nam forma puncti que instituitur in medio alterius visus venit ad centrum. Forma autem puncti obliqui a medio reliqui visus veniet ad 50 punctum aliud a centro et obliquum a centro secundum obliquationem puncti superficiei visus.

[2.48] Ex hac igitur experimentatione et expositione declaratur bene quod visum in quo currunt duo axes semper

25 concurrerint: concurrunt C1/in¹ om. S 26 est om. P3/est igitur transp. R
 27 est om. P3 28 videtur corr. ex videntur C1/etsi: quamvis R 29 ipsum: ipsam
 P1S/sunt: sint Er 30 enim: eorum P1 34 post centri add. communis C1
 35 etiam inter. P1/dyametrorum (36) inter. a. m. Er 36 scilicet om. R/utrumlibet:
 utrumque P3; utramlibet R/eorum: earum P1RS 37 ipsum: ipsam R/propinqui:
 propinqua S 38 ipsum: ipsam R 39 qui: que EEerL3P1P3S 40 sinistrum:
 sinistram R/erunt ... dextrum (41) om. Er/ab axe: sub axes P1/qui: que P1S 41 visu
 corr. ex visuo P1/dextrum: dextram R/post dextrum add. dyametrum C1P1S (mg. a. m.
 C1)/post axe add. et R/forme quidem om. C1EErL3P3/quidem om. R/post quidem add.
 eruntque C1EErL3P3 (corr. ex erunt a. m. C1) 42 istorum: istarum R/post istorum
 add. et R/ante et add. omnia puncta C1EErL3P3R/etiam om. C1EErL3P3R 43 in ...
 concurrerint (44) om. L3/quando: quomodo C1Er/quando ... medio (44) mg. a. m. C1
 45 igitur: ergo Er; etiam P1S 46 post visus scr. et del. est C1 47 a inter. E/forma:
 formae R 48 que: quod ErP1S/venit: veniet R 49 autem: vero R 50 et
 ... centro mg. a. m. C1/obliquationem (51): obliquitatem C1 51 ante puncti scr. et del.
 in P3 52 igitur: ergo P1S/et inter. S/declaratur (53): declarabitur C1L3 53 cur-
 runt: concurrunt C1L3R/duo: duos P3

videtur unum; et quod unumquodque visorum etiam in quibus
 55 concurrunt radii qui sunt consimilis positionis in parte inter
 quos non est maxima diversitas in remotione a duobus axibus
 videtur etiam unum; et quod visum in quo concurrunt radii
 consimilis positionis in parte et diverse positionis in remotione
 a duobus axibus maxima diversitate videtur duo; et quod
 60 visum quod comprehenditur per radios diverse positionis in
 parte videtur duo, etsi remotiones radiorum exeuntium ad
 ipsum a duobus axibus sunt equales; et quod omnia ista erunt
 sic dum duo axes concurrerint in uno viso.

[2.49] Et omnia visa assueta sunt opposita ambobus visi-
 65 bus, et ambo visus inspiciunt ad quodlibet eorum. Ergo duo
 axes duorum visuum semper concurrunt in eis, et positio radi-
 orum residuorum qui concurrunt communi puncto eorum est
 positio consimilis in parte, et non differunt in remotione a
 duobus axibus maxima differentia. Et ideo quodlibet visibili-
 70 um assuetorum visorum videtur ambobus visibus unum, et nul-
 lum visibilium videtur duo nisi raro. Nullum enim visibilium
 videtur duo nisi cum positio eius in respectu amborum visuum
 fuerit diversa maxima diversitate, aut in parte, aut in remotio-
 ne, aut in utraque; et positio unius visi apud duos visus non
 75 diversatur quidem maxima diversitate nisi raro.

[2.50] Causa igitur propter quam unumquodque visorum
 assuetorum videtur unum ambobus visibus declarata est ratio-
 ne et experientia.

[2.51] Et etiam, cum experimentator abstulerit individuum
 80 quod est in medio tabule, et inspexerit punctum sectionis quod
 est in medio tabule, et intuetur tunc lineas scriptas in tabula,
 inveniet duos dyametros quattuor. Et inveniet cum hoc duos
 illorum quattuor propinquos sibi et duos a se remotos, et cum
 hoc omnes se secantes super punctum medium qui est punctus
 85 sectionis duorum dyametrorum qui est super axem communem.

55 inter: in P1 56 quos *corr. ex* quod L3 58 remotione: parte remotio P1
 59 et . . . duo (61) *mg. a. m. S* 60 quod *inter. L3* 61 etsi: quamvis R 63 dum:
 cum P1/concurrerint: concurrent EP3R; concurrunt P1S/viso: visu E 64 *post* visa
scr. et del. sunt C1L3 65 *post* eorum *scr. et del. cum P1* 66 in eis *mg. a. m. C1*
 67 concurrunt: currunt C1/*post* concurrunt *add. in C1P1RS* 68 differunt:
differt P1RS 70 assuetorum visorum *transp. ErP1S/visorum om. R* 72 positio:
 compositio R 74 utraque: utroque R/et: aut L3 75 quidem *om. ErP1S*
 80 punctum: medium EL3P3R; *corr. ex* medium *a. m. C1* 81 intuetur: intuitus fue-
 rit R 82 *post* dyametros *add. etiam P1S/cum rep. P3/cum* hoc: simul R/duos illorum
 (83): duas illarum R 83 propinquos: propinquas R/duos: duas R/remotos: remotas
 R/cum hoc (84): etiam R 84 se *rep. C1/qui: quod R/punctus: punctum R*
 85 duorum: duarum R/qui: quod R

Et inveniet utrumque illorum remotorum magis remotum a medio quam sit in rei veritate. Deinde cum experimentator cooperierit alterum visum, videbit duos dyametros, et videbit spatium inter eos maius quam in rei veritate secundum suam
 90 piramidationem, quod autem est magis amplum de ipso est latitudo tabule. Et apparebit quod dyameter remotus a medio est dyameter qui sequitur visum coopertum.

[2.52] Ex quo declaratur quod duo dyametri qui videntur propinqui cum visio fuerit in utroque visu sunt illi quorum
 95 uterque videtur visu sequenti et quod duo dyametri remoti sunt illi quorum uterque videtur visu obliquo. Propinquitas autem duorum quattuor est quia, cum duo axes concurrerint in individuo posito in medio, tunc uterque dyametrorum comprehendetur a visu sequenti per radios valde propinquos axi, quapropter forme eorum propter hoc erunt in concavitate communis nervi valde propinqui centro. Et erit punctus sectionis eorum in ipso centro, unde videntur propinqui sibi et medio. Remotio autem duorum quattuor est quia uterque dyametrorum comprehendetur etiam alio visu obliquo ab ipso, quapropter
 105 comprehenditur per radios remotos ab axe. Et alterum comprehenditur per radios dextros ab axe, et reliquum per radios sinistros ab axe alio, quapropter forme eorum instituentur in concavitate communis nervi remote. Infiguntur enim in duabus partibus contrariis in respectu centri, et cum hoc remotis a centro, unde duo dyametri habent duas formas propinquas sibi et
 110 duas formas remotas a se. Quare vero comprehenditur remotio utriusque remotorum a medio maior quam sua remotio vera est quia remotio que est inter duos dyametros comprehenditur ab utroque visu maior quam sit in rei veritate. Et hoc apparet
 115 quando experimentator cooperit alterum visum et inspexerit

86 utrumque . . . remotorum: utramque illarum remotarum R/remotum: remotam R; corr. ex remotorum Er 88 cooperierit: cooperuerit R/visum rep. P3/duos: duas R/et inter. L3 89 eos: eas R/maius om. P1; corr. ex magis L3 90 autem om. EP3 91 remotus: remota R 92 qui: quae R 93 duo: duae R/qui: quae R 94 propinqui: propinquae R/visio corr. ex viso L3/illi . . . uterque (95): illae quarum utraque R 95 visu . . . videtur (96) mg. a. m. E/sequenti: sequente R/duo: duae R; om. P1S/remoti: remotae R 96 illi . . . uterque: illae quarum utraque R 97 duorum: duarum ex R/cum inter. E 98 uterque: utraque R 99 sequenti: sequente R 100 communis (101): communi S 101 propinqui: propinquae R 102 propinqui: propinquae R 103 duorum: duarum ex R/uterque: utraque R 104 comprehenditur: comprehenditur C1EErL3P3R/ante etiam scr. et del. p Er/post etiam inter. ab L3 105 et . . . alio (107) om. P1S/alterum: altera R 106 reliquum: reliqua R 107 eorum: earum R 108 infiguntur: infigentur P1RS/enim: etiam P1S 109 contrariis om. P3/cum hoc: etiam R 110 duo: duae R 111 comprehenditur: comprehendatur R 112 utriusque: utrius P3/remotorum: remotarum R/post quam add. sit R 113 duos: duas R 115 cooperit: cooperuerit R

per reliquum. Quare vero, quando experimentator cooperit
alterum visum et inspexerit per reliquum tantum, inveniet spa-
tium inter duos dyametros magis amplum quam in rei veritate
est, quia spatium quod est inter duos dyametros comprehendi-
120 tur ab utroque visu valde propinquum visui, et omne quod est
valde propinquum visui videtur maius quam sit in rei veritate.
Et causa huius declarabitur post cum loquemur de deceptioni-
bus visus.

[2.53] Ex consideratione igitur dispositionum dyametrorum
125 que sunt in tabula et individuorum positorum super eos non in
medio, apparet quod omne visum positum super axem com-
munem et comprehensum a visu per axem radialem compre-
hendetur in suo loco, sive comprehendatur uno visu et per
unum axem axium duorum visuum, sive comprehendatur per
130 duos visus et per ambos axes. Et declaratur quod omne visum
comprehensum per unum visum et per axem radialem, quando
visum non est super axem communem, comprehendetur in loco
propinquiori communi axi quam suo loco vero. Et hoc etiam
sequitur in eis que comprehenduntur per residuos radios preter
135 axem. Quoniam, cum visus comprehenderit rem visam secun-
dum quod est, et instituetur forma in concavitate communis
nervi in uno loco et continua sibi invicem secundum continua-
tionem rei vise, et punctus visi qui est super axem radialem
cum non fuerit super axem communem, videatur in loco pro-
140 pinquiori communi axi quam suo loco vero, tunc puncta resi-
dua etiam videntur in loco propinquiori communi axi quam
suo loco vero, quia sunt continuata cum parte que est apud ex-
tremum axis.

[2.54] Et si axes duorum visuum concurrent in aliquo viso

116 cooperit: cooperuerit R 117 reliquum: unum *ErP1S*/inveniet: inveniat R
118 duos: duas R 119 est¹ *rep. ErL3*/duos: duas R 121 post visui *scr. et del.* et
omne quod est visui *S*/maius: magis *P1P3S*; *corr. ex magis Er* 122 huius: huiusmodi
C1/loquemur: loquetur *S*/de *om. P1* 124 consideratione: consideratio *P1*/igitur *om.*
C1; *inter. L3* 125 eos: eas *R*/post eos *inter. et a. m. C1* 126 visum *om. P1S*
128 ante uno *scr. et del.* per duos visus *Er* 130 per *om. R* 131 ante per¹ *scr. et del.*
non est super axem *L3*/quando: quod *C1EErL3P3R* 132 comprehenditur:
comprehenditur R 133 propinquiori: propinquiore *R*/etiam sequitur (134) *corr. ex*
sequitur etiam Er 134 comprehenduntur: comprehenduntur *C1L3*; comprehenditur
Er/preter *mg. a. m. E*; *corr. ex pre P3* 135 cum: quando *Er* 136 et *scr. et del. C1*/
instituetur: instituta fuerit R 137 post nervi *add. in concavitate P3*/secundum: scilicet
P1S; *alter. in propter a. m. E* 138 punctus: punctum *R*/qui: quod *C1* 139 cum:
et *P1S*/propinquiori (140): propinquiore R 140 communi: omnium *Er*/communi axi
corr. ex omnium axium L3/tunc *om. P1S*/ante puncta *add. et ErP1S*/post puncta *add.*
sua *C1EL3P3R* 141 propinquiori: propinquiore *R*/quam *om. EErL3P3R*; *mg. a. m. C1*
144 concurrent: concurrerent *EErL3P3R*/aliquo: alio *Er*

145 extra axem communem, sequitur etiam ista dispositio, scilicet
 quoniam videtur in loco propinquiori communi axi quam suo
 loco vero. Sed ista positio raro accidit, cum enim illi axes
 duorum visuum concurrerint in aliquo viso, tunc in pluribus
 dispositionibus axis communis transibit per illud visum. Et
 150 nunquam axes duorum visuum concurrent in aliquo viso extra
 axem communem nisi per laborem aut per impedimentum
 cogens visum ad hoc, et hec dispositio non apparet in visis
 assuetis. Nam cum accidit hoc in aliquo viso, continget in
 omnibus visis continuis cum illo visu, unde positio visorum
 155 apud se invicem non transmutabitur propter hoc. Et cum
 positio illius visi in respectu visorum vicinantium non fuerit
 transmutata, tunc non apparebit transmutatio sui loci cum
 acciderit in visis assuetis. Quando ergo consideratur hec via
 predicta, declarabitur ex illa experientia quod hoc sequitur in
 160 omnibus visis in quibus concurrunt axes duorum visuum que
 sunt extra axem communem.

[2.55] Et etiam oportet experimentatorem accipere tres
 scrotulas pargameni parvas equales, et scribet in una verbum
 aliquod scriptura manifesta. Et in residuis scribet illam ean-
 165 dem partem, et in illa quantitate, et in illa figura, et ponat
 individuum unum in medio tabule, ut prius, et ponat alterum
 individuum super punctum **K**. Deinde applicet unam scrotu-
 lam cum individuo quod est in medio tabule, et aliam in punc-
 to **K**, et servet se ut positio eius sit sicut positio prime scrotu-
 170 le. Et ponat tabulam, ut prius fecit, et dirigat pupillam ad
 scrotulam que est in medio individuo, et intueatur illam. Tunc
 quidem comprehendet partem scriptam super illam certa com-

145 sequitur: sequetur C1EErL3P3; sequeretur R/etiam corr. ex aliam a. m. S
 146 quoniam videtur: quod videretur R/videtur: videbitur C1EErL3P3/propinquiori:
 propinquiore R 147 ista inter. a. m. S/illi: isti P1S/illi axes transp. EP3 148 con-
 currerint: occurrerint P1; alter. ex occurrunt in occurrerint S/viso: visu P1 149 axis
 communis transp. S/post illud scr. et del. i S/et . . . visuum (150) mg. a. m. S 150 con-
 current: concurrerint Er; concurrant L3 152 et corr. ex ut a. m. C1/et hec om. Er/in
 om. EEerL3P3 153 accidit: acciderit R/post viso add. assueti C1EErL3P3R (scr. et
 del. C1) 154 visu: viso L3R/unde: unum S 155 apud: inter R 156 visi om.
 P1S/visorum vicinantium transp. L3/vicinantium: incinantium Er/non: cum P1
 158 quando ergo: cum igitur C1EErL3P3/via: vita Er; una S 159 hoc sequitur
 transp. S 162 accipere inter. L3/post accipere add. scilicet EP3/tres . . . pargameni
 (163): pargameni tres scrotulas C1EErL3P3 163 scrotulas: schedulas R/pargameni:
 pargamenum EEerP3/scribet: scribat R 164 scribet: tribus L3; scribat R
 165 quantitate: qualitate P1S/illa² om. Er/ponat: ponatur P1 166 unum om. P1S/
 post ponat add. etiam C1EErL3P3R 167 scrotulam (168): schedulam R 169 servet
 se: observet R/eius om. P1S/sit . . . positio mg. a. m. S/post positio add. eius P1S/scrotule
 (170): schedulae R 171 scrotulam: schedulam R 172 quidem om. P1R

prehensione. Et comprehendet cum hoc in illa dispositione ali-
am scrotulam et partem scriptam in ea, sed non bene declara-
tam sicut est pars consimilis illi que est scripta in media scro-
tula, licet sint consimiles in figura, forma, et quantitate.

[2.56] Deinde in hac dispositione oportet experimentator-
em accipere tertiam scrotulam manu sequenti punctum **K**, et
ponat illam in verticatione duarum scrotularum que sunt in
tabula et in rectitudine extensionis lineae que est in latitudine
tabule que est in superficie tabule quantum ad sensum, sed
tamen sit remota a tabula. Et huiusmodi verticatio vocetur
verticatio facialis. Et observet se experimentator ut positio
tertie scrotule et positio partis que est in illa, quando ponit
scrotulam, sit similis positioni duarum scrotularum que sunt in
tabula. Et tunc figat ambos visus in scrotula posita in medio, et
dirigat pupillam ad ipsam, et tunc quidem comprehendet
tertiam scrotulam, si non fuerit multum remota a tabula, sed
comprehendet formam partis que est in ea dubitabilem et non
intelligibilem. Et non inveniet illam sicut invenit formam partis
similis illi que est in medio tabule, nec sicut invenit formam partis
que est apud punctum **K**, dum ambo visus direxerint pupillam
ad scrotulam que est in medio.

[2.57] Deinde auferat experimentator individuum quod est
apud punctum **K** et scrotulam que est in illo, et appropinquet
tunc scrotulam quam tenet in manu quousque applicet eam ad
latus scrotule applicate cum individuo posito in medio, et pre-
servet se quod scrotula sit perpendicularis super lineam posi-
tam in latitudine. Et diriget pupillam, sicut prius, ad scrotu-
lam positam in medio. Tunc quidem in medio comprehendet

173 comprehendet cum hoc: cum hoc comprehendet P3/cum hoc: simul R/post
dispositione scr. et del. et comprehendet cum hoc in illa dispositione S 174 scrotulam:
schedulam R/in ea inter. a. m. S/non inter. a. m. S 175 consimilis: similis C1EErL3R/
scrotula (176): schedula R 178 scrotulam: schedulam R/sequenti: sequente R
179 scrotularum: schedularum R 181 que . . . tabule om. P1 182 huiusmodi:
huius R 183 facialis: facilis EP1P3; corr. ex facilis L3/se om. R 184 scrotule:
schedulae R 185 scrotulam: schedulam R/post scrotulam add. ut C1/similis: simul
P1; inter. EL3 (a. m. E)/scrotularum: schedularum R 186 scrotula posita: schedulam
positam R 188 scrotulam: schedulam R 189 dubitabilem: dubitabile Er; corr. ex
dubitabilis L3; alter. in dubitabilem S/et om. C1EErL3P3 190 intelligibilem:
intelligibile Er; corr. ex intelligibilis L3/illam: eam C1EL3P3/post sicut scr. et del. sicut S/
invenit: inveniet EP3 191 que: qui S/invenit: invenietur P3; alter. in inveniet a. m. E
192 K corr. ex E a. m. E 193 scrotulam: schedulam R 194 experimentator corr.
ex experimentatorem P1/est om. P1 195 punctum om. P3/scrotulam: schedulam R;
scrotula S/illo: eo EP3 196 tunc: ad ErL3; om. C1EP3R/scrotulam: schedulam R/
quam: que P3/ad: et Er; corr. ex et L3 197 scrotule: schedulae R/applicate corr. ex
applicata P3/posito: sito EP3 198 quod scrotula: ut schedula R 199 scrotulam
(200): secundam ErP1; schedulam R; corr. ex secundam L3S (a. m. S)

ambas partes que sunt in duabus scrotulis comprehensione manifesta et certificata, et non erit inter formas duarum partium in declaratione et certificatione differentia sensibilis.

[2.58] Deinde experimentator moveat scrotulam quam
 205 tenet in manu motu subtili super lineam positam in latitudine tabule, et preservet se ut situs eius sit sicut erat prius. Et intendat certificare scrotulam que est in medio, et intueatur bene duas scrotulas in hoc statu. Tunc quidem videbit scrotulam motam quod quanto magis removetur a medio, tanto diminuitur declaratio partis que est in ea. Cum igitur venerit
 210 apud punctum K, tunc inveniet formam partis intelligibilem, sed non tanto quanto cum erat apud suam applicationem cum secunda que est in medio.

[2.59] Deinde experimentator moveat scrotulam etiam, et
 215 extrahat illam a tabula, et removeat illam paulatim et paulatim in verticatione lineae posite in latitudine. Et intueatur considerans optime, et dirigat pupillam ad scrotulam positam in medio. Quoniam tunc inveniet scrotulam motam quod quanto magis removetur a medio, tanto minus apparebit pars scripta
 220 in ea, adeo quod non erit intelligibilis omnino. Deinde cum moverit illam post hoc, videbit illam quod quanto magis removetur a medio, tanto magis latebit forma illius partis scripte in ea.

[2.60] Et etiam cooperiat experimentator visum qui sequitur
 225 punctum T, et figat tabulam in eadem dispositione, et dirigat pupillam unius visus qui sequitur punctum K ad scrotulam positam in medio. Et applicet aliam scrotulam ad latus scrotule posite in medio, sicut fecit prius. Tunc quidem inveniet partem que est in alia scrotula manifestam etiam, inter

201 duabus: duobus *Er*/scrotulis: schedulis *R* 202 post inter *add.* duas *C1EL3P3R*
 204 moveat: movea *P1*; *corr.* ex movet *a. m.* *C1E*/scrotulam: schedulam *R* 205 motu
om. *P1* 206 tabule *om.* *C1EL3P3* 207 scrotulam: schedulam *R*/in inter. *L3*
 208 scrotulas: schedulas *R*/scrotulam motam (209) *om.* *R* 209 post magis *add.*
 schedula mota *R*/removetur *corr.* ex movetur *L3*/post tanto *add.* magis *R* 211 K *corr.*
ex E a. m. E 212 tanto quanto: tantum quantum *R*/erat: esset *R* 213 secunda:
 scrotula *C1EP3*; schedula *R* 214 moveat *corr.* ex movet *a. m. E*/scrotulam: schedulam
R/etiam et *transp.* *C1L3* 215 removeat *corr.* ex removet *C1*; *corr.* ex removea *P1*
 216 posite in latitudine: in . . . posite *P3* 217 ad scrotulam *om.* *P1*; scrotulam:
 schedulam *R* 218 inveniet: inveniat *C1L3*/scrotulam motam *om.* *R*/post quod *add.*
 schedula mota *R*/quanto: quam *P3* 219 ante a *scr.* et *del.* a movetur *L3*/a medio
om. *P1S* 220 non *om.* *Er*; inter. *L3*/non erit *transp.* *EP3R* 221 hoc: hec *C1*/post
 magis *add.* illa *R* 222 latebit *om.* *Er*/post latebit *scr.* et *del.* pars scripta in ea adeo quod
 erit non intelligibilis omnino *E*/scripte: scriptis *Er* 225 figat *corr.* ex fiat *Er*
 226 scrotulam (227): schedulam *R* 227 scrotulam: schedulam *R* 228 scrotule:
 schedulae *R*/scrotule posite *transp.* *P3*/prius *om.* *P3* 229 scrotula: schedula *R*/
 manifestam: manifesta *Er*/etiam: et *EP3*; *om.* *P1RS*

230 quam et scrotulam positam in medio non est differentia sensibili-
lis. Deinde moveat secundam scrotulam, ut primo fecit, et
intendat scrotulam positam in medio, et dirigat pupillam ad
ipsam. Tunc quidem inveniet partem que est in secunda scro-
tula apud motum latere, et cum pervenerit ad punctum **K**, tunc
235 erit inter suam certificationem in hoc statu et suam certificatio-
nem apud applicationem suam cum ea que est in medio differ-
entia sensibilis. Deinde moveat hanc scrotulam, et extrahat
illam a tabula, ut primo fecit, et intueatur scrotulam positam
in medio. Tunc quidem inveniet quod scrotula mota quanto
240 magis removetur a medio, tanto magis diminuitur declaratio
que est in ea, adeo quod forma eius non erit intelligibilis; et
quanto magis post removetur a medio, tanto magis latebit.

[2.61] Apparet igitur ex hac consideratione quod manifes-
tissimum visibilium facialium visui que comprehenduntur
245 ambobus visibus est illud quod est apud concursum duorum
axium, et quod est propinquius concursui duorum axium est
manifestius remotiori, et quod forma remoti visi ad concursum
duorum axium est non certificata, etsi comprehendatur utro-
que visu. Amplius apparet ex hac consideratione quod mani-
250 festissimum visibilium facialium que comprehenduntur uno
visu est illud quod videtur per axem radialem, et illud quod
est propinquius illi est manifestius quam illud quod est remo-
tius, et quod remotum visum a radiali axe habet formam dubi-
tabilem non certificatam. Amplius apparet quod visus non
255 comprehendit rem visam que est remotorum dyametrorum vera

230 scrotulam: schedulam R 231 scrotulam: schedulam R/ut inter. L3; corr. ex in
a. m. Er 232 post intendat inter. in C1/scrotulam: schedulam R 233 inveniet:
invenient EL3P3/partem: per eam EErL3P3; corr. ex per eam a. m. C1/scrotula (234):
schedula R 234 latere corr. ex late C1 235 in . . . certificationem (236) inter. L3
236 post ea scr. et del. ea Er 237 moveat corr. ex movet a. m. C1/hanc inter. L3/
scrotulam: schedulam R 238 intueatur corr. ex intuetatur E/scrotulam: schedulam
R/positam in medio (239): in . . . positam R 239 scrotula: schedula R 240 magis:
minus R/magis²: minus EErL3P3R; corr. ex minus a. m. C1; alter. ex maius in minus
a. m. S 241 non: omnino R; om. Er; inter. L3; non erit transp. EL3P3S 242 post
om. P1R 243 igitur: ergo R/post igitur add. quod EP3/quod: cum Er/quod
manifestissimum (244) alter. in cum manifestissimo L3/manifestissimum (244):
manifestissimo Er 244 ante visibilium add. est EP3/facialium: faciliū EP3/visui:
visu ErL3/comprehenduntur: comprehenditur Er 246 concursui: cursui EErL3; corr.
ex cursui a. m. C1; corr. ex concursu S/post axium² rep. et . . . axium P1 (ante et scr. et del.
est) 247 remotiori: remotiore P1RS/quod mg. C1/ad concursum: a concursu C1/
concursum: cursum Er 248 post axium scr. et del. et quod est propinquius cursui
duorum axium E/etsi: licet R/post etsi add. quis L3P3 (inter. a. m. L3) 250 visibilium
om. Er/facialium corr. ex faciliū a. m. E 251 visu corr. ex viso L3/quod¹ om. Er/illud²
om. C1 252 est propinquius transp. P3 253 quod om. P1S 254 post apparet
add. ex hac C1 255 comprehendit corr. ex comprehenduntur P1/remotorum:
remotarum R

comprehensione nisi moveat radialem axem super omnes eius
 dyametros et super omnes eius partes, sive comprehensio sit
 ambobus visibus sive uno. Visus enim, cum fuerit fixus in
 oppositione visi quod est maximorum dyametrorum, non com-
 260 prehendet totum vera comprehensione, sed solummodo illud
 quod est supra axem et prope certificata comprehensione.
 Residue vero partes eius, et illud quod remotum est ab axe
 scilicet, comprehendet, sed non certe, licet visum sit faciale—et
 indifferenter sive comprehensio sit utroque visu sive uno
 265 tantum.

[2.62] Postea oportet experimentatorem accipere parga-
 menum quattuor digitorum in omni dimensione in quo scribat
 lineas scriptura subtili, tamen manifesta et intelligibili. Deinde
 auferat individuum positum super tabulam, et superponat
 270 tabulam prope visum, ut prius fecit, et erigat pargamenum
 super lineam positam in latitudine quod est in medio tabule.
 Et dirigat pupillam utroque visu ad medium pargameni, et
 intueatur ipsum. Quoniam tunc inveniet scripturam que est in
 pargameno apertam et intelligibilem, sed tamen scriptura que
 275 est in medio pargameni est manifestior quam que est in extre-
 mis quando visus direxerit pupillam ad medium pargameni et
 non fuerit motus super omnes eius dyametros.

[2.63] Deinde obliquet pargamenum adeo quod secet line-
 am positam in latitudine in puncto posito in medio tabule, qui
 280 est punctus sectionis. Obliquatio autem pargameni super line-
 am positam in latitudine sit parva. Et inspiciat ambobus visi-
 bus medium pargameni. Quoniam tunc inveniet scripturam
 legibilem, sed non tantum quantum cum pargamenum erat
 faciale.

285 [2.64] Deinde experimentator debet obliquare pargamenum
 obliquatione maiori prima ita quod medium eius sit super
 punctum sectionis, et dirigat etiam pupillam utroque visu ad

257 eius om. P1 259 maximorum: maximarum R 260 solummodo: solum R
 261 supra: super C1EL3P3R/post certificata add. scilicet C1EErL3P3R 262 est
 om. P1S 263 comprehendet: comprehendit EL3P3; comprehendetur P1RS/faciale
 corr. ex facile L3 264 post sit add. in C1 266 post postea add. ergo EP3
 267 dimensione: divisione R 268 tamen corr. ex cum a. m. C1 269 superponat:
 super Er; alter. ex supponat in ponat L3 271 quod: quae R 272 pargameni corr.
 ex pargamenum P3 273 intueatur: intuat Er; corr. ex intuetatur C1/ipsam
 P3; alter. in ipsam a. m. E/inveniet: invenient L3 274 tamen om. P3 275 est³ om.
 P1S/extremis (276) corr. ex tremis S 276 direxerit: direxerat P1 277 eius om.
 C1L3P3/eius dyametros corr. ex dyametros eius Er 279 qui: quod R 280 punc-
 tus: punctum R/autem: enim L3 283 post quantum add. est pargamenum C1/
 pargamenum erat om. P1 286 obliquatione corr. ex obliquare P3/maiori: maiore R/
 quod: ut R 287 etiam om. R/utroque visu transp. EP3

medium eius. Tunc quidem videbit scripturam latentior
 290 prima. Deinde etiam obliquet pargamentum paulatim paulatim
 ita quod medium eius semper sit in puncto sectionis, et intueatur
 eam successive. Et tunc inveniet scripturam latere apud
 obliques pargamenti, et quanto magis pargamentum fuerit
 obliquum, tanto magis latebit scriptura, adeo quod pargame-
 num appropinquet lineae extense in medio longitudinis tabule.
 295 Et tunc scriptura que est in pargamento videbitur multum dubi-
 tabilis, et fere non intelligibilis et non certificata.

[2.65] Deinde oportet experimentatorem revertere parga-
 mentum ad primam positionem, et erigere ipsum super lineam
 positam in latitudine, et cooperire alterum visum, et inspicere
 300 pargamentum reliquo visu. Et tunc inveniet scripturam mani-
 festam et legibilem. Deinde obliquet pargamentum, ut prius
 fecit, et inspicat ipsum uno visu. Et tunc inveniet scripturam
 latentior quam cum erat apud oppositionem facialem. De-
 inde obliquet pargamentum plus paulatim paulatim, et intueatur
 5 ipsum multoties. Et tunc inveniet quod quanto magis
 obliquatur, tanto magis latet pars scripta, adeo quod pargame-
 num appropinquet diametro qui sequitur visum apertum.

[2.66] Declarabitur ergo ex hac consideratione quod mani-
 festissimum visibilium que sunt super axem radialem est illud
 10 quod est faciale visui, et illud cuius positio est magis facialis
 est manifestius illo cuius positio est minus facialis, et quod
 illud quod est obliquum ab axe radiali obliques maxima
 est dubitabile et non intelligibile, sive visio sit utroque visu sive
 uno.

15 [2.67] Deinde oportet experimentatorem revertere indivi-
 duum quod erat super tabulam, et ponere ipsum in medio tabule,
 et applicare ipsum ad punctum sectionis, ut in prima con-

288 latentior: latentior P1 289 obliquet: obliquet C1/paulatim² om. P1; inter. L3
 290 ante ita scr. et del. prima S/quod: ut R 291 latere corr. ex late C1 292 obli-
 quationes: obliques C1L3/post magis scr. et del. per S/fuerit: fuit L3 293 quod:
 ut R 294 appropinquet: appropinquet C1EL3P3/post longitudinis scr. et del. to S
 295 est inter. L3/dubitabilis (296): durabilis P1 296 non¹ om. Er; inter. L3 297 re-
 vertere: vertere R; corr. ex resistere a. m. C1 299 alterum om. C1L3 300 reliquo:
 reliqua Er/visu corr. ex usu S 2 fecit corr. ex sit L3 3 facialem corr. ex facilem L3
 4 post paulatim¹ add. et C1R/paulatim² inter. L3 5 quod quanto corr. ex quanto
 quod Er 6 obliquatur: obliquetur P1S/post latet scr. et del. s C1/pars: per P3/quod:
 ut R 7 appropinquet: appropinquet C1EErL3P3 8 ergo: igitur C1EErP3; om. L3
 9 sunt om. Er; corr. ex est C1L3 (a. m. C1)/post est scr. et del. sunt C1 10 faciale corr. ex
 facile L3/post et add. quod R/illud: istud S 11 est¹ om. P3/post quod add. est L3
 12 post illud scr. et del. quod est illud L3 13 et om. E/visio sit transp. C1L3/visu sive:
 visus P1 15 oportet: oportebit C1EErL3P3/revertere: vertere R 16 ipsum in
 medio corr. ex in . . . ipsum Er/in . . . ipsum (17) inter. L3 17 applicare: applicare Er

sideratione. Deinde erigat pargamentum super alteram partem
 lineae posite in latitudine super verticationem facialem, et diri-
 20 gat pupillam utroque visu ad individuum positum in medio. In
 hac quidem dispositione comprehendet pargamentum et scrip-
 turam que est in ipso, sed illud quod vicinatur individuo posi-
 to in medio erit manifestum, et quod remotum est ab illo est
 dubitabile et latens. Et quanto magis removetur ab individuo,
 25 tanto magis latet.

[2.68] Et etiam oportet experimentatorem obliquare parga-
 mentum in hoc statu ita quod secet lineam positam in latitudine
 super aliquod punctum alterius eius partis, et sit parva obli-
 quatio. Et dirigat pupillam ad individuum positum in medio.
 30 Tunc quidem videbit scripturam que est in pargameno laten-
 tiorem quam cum erat facialis. Deinde obliquet plus parga-
 mentum, et dirigat pupillam ad individuum positum in medio.
 Tunc quidem videbit scripturam dubitabilem, non manifestam
 nec legibilem.

35 [2.69] Deinde oportet experimentatorem cooperire alterum
 visum et inspicere uno visu, et revertat pargamentum in sua
 prima positione, et erigat ipsum super partem lineae posite in
 latitudine que sequitur visum inspicientem, et dirigat pupillam
 unius visus ad individuum positum in medio. Tunc quidem
 40 comprehendet etiam scripturam que est in pargameno, et vide-
 bit illam que est prope individuum manifestiorem remota, et
 videbit illam que est remotissima ab individuo dubitabilem et
 non legibilem.

[2.70] Deinde obliquet pargamentum ita quod secet lineam
 45 positam in latitudine super punctum partis super quam erat
 erectum, et inspiciat individuum positum in medio illo eodem
 visu. Tunc quidem videbit scripturam que est in pargameno
 dubitabilem et illegibilem magis quam cum pargamentum erat
 faciale. Deinde obliquet pargamentum magis paulatim paula-

19 facialem: radialem P1; corr. ex facilem P3 20 post pupillam add. in L3/indi-
 viduum corr. ex dividuum S 22 vicinatur: intueatur P3; propinquum est R
 23 in medio inter. L3; mg. a. m. C1/remotum om. P1 24 post individuo add. posito in
 medio C1 (posito mg. a. m.) 26 etiam: iterum R 27 quod: ut R 28 punctum
 mg. a. m. Er/post parva add. eius P1 29 post pupillam add. per P1 30 latentiorem
 (31) corr. ex latiore C1L3 31 obliquet: obliquat C1ErL3 33 post scripturam scr.
 et del. que est in pargameno C1/non: nec P1; inter. P3 34 nec mg. a. m. C1/post nec
 add. et C1 36 uno om. Er/revertat: revertatur C1; vertat R 37 super om. Er
 38 sequitur: sequuntur C1L3 40 etiam scripturam: et scriptam P1 42 remotissima:
 remotissimam P1 44 quod: ut R 45 latitudine: latitudinem EP1/erat rep. P3
 47 que est om. P1; est om. L3 48 et om. P1S/illegibilem: legibilem Er/erat: erit P1S
 49 faciale: facile L3/post paulatim¹ add. ac R/paulatim (50) inter. a. m. S

50 tim, et videbit quod quanto magis obliquatur pargamenum,
tanto magis latet scriptura.

[2.71] Apparet igitur ex hac consideratione quod visum
quod est faciale est manifestius viso obliquo, etsi visum non
55 fuerit super axem radialem et fuerit extra axem. Visum enim,
quando multum est obliquum, latet multum, etsi sit super
axem radialem, sive visio sit utroque visu sive uno tantum.

[2.72] Et etiam oportet experimentatorem auferre individu-
um a tabula, et erigere pargamenum super extremum tabule,
et superponere finem eius fini latitudinis tabule quod est CD,
60 et dirigat pupillam utroque visu ad medium pargameni. Quo-
niam tunc inveniet scripturam manifestam et legibilem.

[2.73] Deinde obliquet pargamenum ita quod secet latitu-
dinem tabule super punctum Z quod est in medio latitudinis
tabule, et dirigat pupillam utroque visu ad medium pargame-
65 num. Tunc quidem videbit scripturam latentem quam prius.
Deinde addat in obliuatione pargameni paulatim paulatim, et
videbit scripturam latere paulatim paulatim, adeo quod, si
obliquatio pargameni fuerit maxima, videbit scripturam valde
latentem in eadem dispositione in qua erat quando considera-
70 batur in medio tabule; et similiter si consideraverit ipsum in hoc
loco uno visu.

[2.74] Deinde oportet experimentatorem ponere individu-
um super punctum Z et erigere pargamenum super alteram
partem latitudinis apud extremum tabule, sicut fecit in medio
75 tabule, et dirigat pupillam ad individuum positum in medio, et
intueatur pargamenum, et consideret scripturam. Tunc quidem
videbit dispositionem sicut videbat eam quando erat in medio
tabule, sive consideretur utroque visu sive uno.

[2.75] Deinde oportet experimentatorem etiam experiri
80 scrotulas parvas quas prediximus apud extremum tabule, et

50 obliquatur: obliquabit C1L3 51 latet: latebit C1EL3P3R 52 igitur: ergo R
53 quod scr. et del. L3/est¹ om. L3/viso: visu EP3/etsi: quamvis R; corr. ex sed si a. m. C1/
visum: visus C1 54 et fuerit: sed R 55 quando: quanto Er/etsi: licet R/post etsi
add. non C1EErL3P1P3RS 56 visio sit: viso sive P3/post sit add. in ErP1S
57 etiam: iterum R 58 a: ex P1 (inter.)/post erigere scr. et del. extremum P1 59 fini
latitudinis: similitudinis Er/quod: qui R 60 pargameni: pargamenum P3 62 par-
gamenum om. P3/quod: ut R 63 quod corr. ex quo C1 64 ad rep. P1/
pargamenum (65): pargameni C1 66 obliuatione: obliuationem C1/post paulatim¹
add. et C1R 67 post paulatim¹ add. et R/post paulatim² scr. et del. paulatim P3/quod:
ut R 68 videbit: videat R 70 post si scr. et del. z C1/ipsam: ipsam P1/ipsam
... loco (71): in hoc ... ipsum P3 72 oportet experimentatorem transp. S 75 diri-
get alter. in dirigat C1 76 post intueatur add. ipsum P1/quidem: enim EL3P3R; corr.
ex enim a. m. C1 77 quando: quanto L3/post quando scr. et del. r Er 78 post tabule
add. et diriget pupillam L3/visu: usu P1 80 scrotulas: schedulas R/parvas corr. ex
per L3/post parvas add. per C1

- videbit dispositionem in eis sicut cum erant in medio, scilicet quoniam pars que est in media scrotula est manifestior parte que est in scrotula remota a medio. Et quanto scrotula magis est remota a medio, tanto magis latebit pars. Sed tamen videbit quod remotio a medio apud quam latet pars posita in extremo, quando consideratio fuerit apud extremum tabule, proportionalis est ad remotionem a medio apud quam latet pars posita in extremo, quando consideratio fuerit in medio tabule, est enim secundum remotionem radiorum exeuntium ad extremum ab axe. Proportio igitur remotionis apud quam latet forma posita in extremo a forma posita in medio ad remotionem forme posite in medio a visu est eadem proportio in consideratione apud medium tabule et in consideratione apud extremum eius.
- [2.76] Et similiter etiam si experimentator abstulerit tabulam et posuerit inde pargamentum in quo est scriptura in maiori distantia quam longitudo tabule sit, et ubi possit legere illam, et fuerit faciale visui, et intueatur ipsam, deinde obliquaverit ipsum in loco suo, inveniet scripturam latere. Et si magis obliquaverit, magis latebit, ita quod, si multum obliquaverit ipsum, adeo quod positio eius sit propinqua positioni radiorum exeuntium ad medium eius, tunc videbit scripturam que est in pargameno latentem valde, adeo quod non possit legi. Et hoc videbit sive consideretur utroque visu sive uno tantum.
- [2.77] Et similiter, cum fixerit aliquam scrotularum parvarum in loco opposito visui remotiori quam sit longitudo tabule, et posuerit ipsam facialem visui, et direxerit pupillam ad ipsam utroque visu, et posuerit aliam scrotulam obliquam super illam aut dextrum aut sinistrum, et erexerit eam ita quod sit facialis, inveniet eam latentiorem.

[2.78] Deinde si aliquis moverit secundam scrotulam et

82 quoniam: quando P1; quod R/scrotula: schedula R 83 scrotula¹²: schedula R/
magis est (84) *transp.* P1R 84 tamen: cum Er 85 quam: quem ErL3; *corr.* ex quem
a. m. C1 86 apud . . . fuerit (88) *mg. a. m. E/proportionalis est* (87) *transp.* C1EErL3P3R
87 pars posita (88) *transp.* C1L3 88 medio *corr.* ex extremo C1 89 exeuntium *corr.*
ex extremum P3 90 quam *om.* P1 92 a visu *om.* R 96 inde *om.* C1EErL3P3R/
maiori: maiore R 97 illam: scripturam C1EL3P3R 98 intueatur: intuetur P3/
post intueatur *scr. et del. p* Er/ipsam: ipsum R 99 loco suo *transp.* C1EErL3P3R
100 si multum: simul cum P1S/ipsam: ipsam P1 101 quod: ut R 102 que est
om. C1EL3P3R/in *om.* C1; *inter.* L3 103 pargameno: pargameni C1/quod: ut R
104 videbit: videbitur C1; *corr.* ex videbitur P1 105 fixerit: fuerit C1/scrotularum:
schedularum R 106 remotiori: remotiore R 108 scrotulam: schedulam R/
obliquam: aliquam EP3 109 *post* illam *add.* scrotulam Er/dextrum: dextrorsum R/
sinistrum: sinistrorsum R/erexerit: erexerat P1; *corr.* ex exit L3/quod: ut R 111 scro-
tulam: schedulam R

removerit eam paulatim paulatim a scrotula ad quam dirigit pupillam, inveniet partem que est in scrotula que est in extremo quod quanto magis remotior est a secunda scrotula, tanto
 115 magis latet forma partis, adeo quod fiet illegibilis omnino. Et similiter, si consideraverit has duas scrotulas uno visu, inveniet talem dispositionem.

[2.79] Declaratur igitur ex istis considerationibus omnibus quod manifestissimum visibilium in omnibus remotionibus est
 120 illud quod est super axem radialem, et quod illud quod est propinquius axi est manifestius remotiore ab ipso, et quod visum remotum ab axe maxima remotione est dubitabilis forme et non certificabilis, et indifferenter sive visio sit uno visu sive utroque, amplius et quod visum faciale est in omnibus remotio-
 125 nibus manifestius viso obliquo, et quod quanto magis positio visus appropinquatur positioni faciali, tanto erit manifestius, et quod visum obliquum super lineas radiales obliquatione maxima habet formam multum dubitabilem et non certificatam, sive visio sit uno visu sive utroque, et sive visum sit super
 130 axem sive extra axem.

[2.80] Quare vero visum multum obliquum est dubitabilis forme, licet remotio eius sit mediocris, et licet magnitudo sit comprehensa secundum quod est, et quare visum faciale est manifestius obliquo, hoc est quia forma visi multum obliqui
 135 instituitur in superficie visus congregata propter suam obliquationem. Quoniam, cum visus fuerit multum obliquus, tunc angulus quem subtendit visum super centrum visus erit parvus, et pars visus in qua instituitur forma illius visi erit minor mul-

112 *post paulatim*¹ *add.* et *R/paulatim*² *om.* *P3/a* scrotula: ad scrotulam *L3*; *corr.* *ex* ad scrotulam *C1*/scrotula: schedula *R* 113 *post pupillam add.* et *P1/partem*: quod forma partis *R*/scrotula: schedula *R* 114 quod: et *P1*; *om.* *R/magis om.* *EP3/post* magis *add.* illa *R/secunda alter.* in prima *a. m.* *C1/scrotula*: schedula *R* 115 forma partis *om.* *R/quod fiet*: ut fiat *R* 116 *si corr.* *ex* sed *S/scrotulas*: schedulas *R*
 118 considerationibus: dispositionibus *EP3*; *corr.* *ex* dispositionibus *L3/post* considerationibus *add.* vel dispositionibus *C1* 119 quod *alter.* *ex* qui in quid *L3/post* quod *add.* quidem *C1* 120 radialem: radiorum *C1EErL3P3* 121 remotiore: remotiori *C1EErL3P3* 122 *post axe scr.* et *del.* *m C1* 123 et¹ *om.* *C1EL3P3R/post* sive¹ *add.* sit *L3/visio corr.* *ex* viso *P3/post* sit *add.* in *P1/uno visu corr.* *ex* utroque visu *P1/post* sive² *add.* in *P1* 124 et: etiam *R* 125 viso *corr.* *ex* visu *Er/quod om.* *P3*
 126 visus appropinquatur: visi appropinquat *R* 127 visum *corr.* *ex* visus *a. m.* *C1/visum obliquum*: visus obliquus *EErL3P3/post* radiales *scr.* et *del.* ob *P3/obliquatione* *corr.* *ex* obliquas *L3*; *corr.* *ex* obliquationes *P3* 128 multum: multam *L3*; *corr.* *ex* multam *C1/multum dubitabilem transp.* *EP3* 129 ante sive¹ *add.* a visu *EErL3P3R*; *mg.* visu *a. m.* *C1/sit*¹: fiat *C1/et inter.* *L3* 131 *post visum scr.* et *del.* o *Er/multum om.* *C1/est*: sit *R* 132 eius *om.* *P15* 133 faciale *corr.* *ex* obliqui *L3/est*²: sit *R*
 134 hoc: haec *R/quia*: quod *P15* 136 cum visus *transp.* *P3/multum om.* *P3*
 137 *post visum add.* quod *Er/super*: per *Er*; *corr.* *ex* per *L3/super . . . visus corr.* *ex* centrum . . . super *Er* 138 multum (139): multo *R*

tum parte in qua instituitur forma eius si fuerit faciale visui.
 140 Et partes eius parve subtenduntur apud visum angulis insensibilibus propter maximam obliquationem, pars enim parva, cum multum fuerit obliqua, tunc due lineae exeuntes a centro visus ad extrema illius partis parve fient quasi una linea; quapropter sentiens non comprehendet angulum contentum
 145 inter eas neque partem quam distinguunt ex superficie visus.

[2.81] Et visum multum obliquum erit dubitabile, quia forma eius que infigitur in visu erit congregata maxima congregatione, et partes eius parve erunt insensibiles, et ideo forma eius erit dubitabilis. Et ideo, si in huiusmodi viso fuerint sub-
 150 tiles intentiones, non comprehenduntur a visu propter latentiam suarum partium parvarum et propter congregationem forme. Visum autem faciale est econtrario, nam forma eius que instituitur in visu erit ordinata secundum quod est in superficie visi, et partes eius parve que possunt comprehendi a visu er-
 155 unt manifeste. Et cum partes parve visi fuerint manifeste et ordinate in superficie visus secundum suam ordinationem in superficie visi, tunc forma erit manifesta et non dubitabilis.

[2.82] Et universaliter intentiones subtiles, et partes sub-
 160 tiles, et ordinatio partium visi non comprehenduntur a visu vera comprehensione nisi cum forma imprimatur in superficie membri sentientis et instituatur quelibet pars eius in parte sensibili superficiei membri sentientis. Et cum visum fuerit multum obliquum, tunc forma eius non imprimetur in visu, nec forme aliquarum partium parvarum infigentur in parte sensibili
 165 visus. Hoc enim non fit nisi quando visum est faciale, aut quando obliquatio eius fuerit parva, et fuerit remotio eius cum hoc ex remotionibus mediocribus in respectu intentionum que

139 instituitur: instituuntur P1S/eius: illius C1EL3P3R/post eius inter. visi a. m. L3; scr. et del. visi erit minus multum parte in qua instituitur forma illius E 140 subtenduntur: sustentantur EErl3P3R; corr. ex sustentantur a. m. C1 142 fuerit: fuerint E
 143 parve: et EP3; corr. ex et L3; om. ErR/fient: fuerit P3/post quasi scr. et del. vel P1
 144 comprehendet: comprehendit C1EL3P3R 145 distinguunt: distinguit C1EL3P3R
 146 post multum add. et EP3 147 infigitur: infigetur P1S 149 eius rep. P1/erit om. P1P3/viso: visio P1/subtiles intentiones (150) transp. C1L3 150 intentiones corr. ex tentiones a. m. E/comprehenduntur P1S 151 parvarum om. P1S/propter om. P1S 152 visum corr. ex visus L3/est om. P1S 154 visi corr. ex visu L3 155 et... manifeste om. C1EL3P3R 156 suam ordinationem transp. Er
 157 post visi add. et C1R 158 et²... subtiles (159) inter. a. m. S 159 partium visi corr. ex visi partium P3 160 imprimatur: imprimitur R 161 et... sentientis (162) mg. L3/instituatur: instituitur R 164 forme: forma C1L3/aliquarum corr. ex obliquarum L3/infigentur: infigetur C1ErL3/post parte scr. et del. sensibili P3/sensibili corr. ex sensibile Er 165 non inter. a. m. Er/est: fuerit R 166 cum hoc (167): simul R 167 post respectu add. remotionum vel C1/intentionum: remotionum P3; corr. ex remotionum EL3 (a. m. E)

sunt in illo viso.

[2.83] Comprehensio vero magnitudinis visi obliqui multum
 170 secundum quod est, cum fuerit in remotione mediocri, licet
 obliquatio eius sit maxima, non est ex ipsa forma visi que in-
 stituitur in visu tantum, sed ex ratione extra formam, scilicet
 ex hoc quod comprehendens comprehendit diversitatem dua-
 175 prendit mensuram forme. Et cum visus comprehenderit
 diversitatem remotionum duorum extremorum visi multum
 obliqui, et comprehenderit differentiam maximam inter eas, sta-
 tim virtus distinctiva ymaginabitur positionem illius visi, et
 comprehendet mensuram eius secundum diversitatem remotio-
 180 num duorum extremorum eius, et secundum mensuram partis
 in qua instituitur forma, et secundum mensuram anguli cui
 subtenditur illa pars apud centrum visus, non solummodo ex
 ipsa forma. Et cum virtus distinctiva comprehenderit diver-
 sitatem remotionum duorum extremorum visi multum obliqui,
 185 et comprehenderit obliquationem eius, statim percipiet con-
 gregationem forme. Comprehendit igitur mensuram eius cum
 senserit quantitatem obliquationis eius, non secundum men-
 suram forme, sed secundum positionem eius. Et partes parve
 et subtiles intentiones que sunt in viso non possunt compre-
 190 hendi ratione si visus non senserit illas partes aut illas inten-
 tiones.

[2.84] Latentia igitur forme visi accidit ex congregatione
 forme eius in visu et ex latentia partium eius parvarum. Et
 apparentia forme visi, cum fuerit in remotione mediocri, est
 195 propter impressionem forme in visu secundum quod est et
 propter hoc quod sentit visus partes eius parvas.

[2.85] Quare igitur forma visi maxime obliqui est dubitabi-
 lis, forma autem visi facialis est manifesta declaratum est.

169 vero: enim C1EErL3P3/visi om. P1S 170 remotione . . . licet: remotionibus
 mediocribus et P1S 171 post est add. hec forma C1EErL3P3 172 visu:
 viso C1EErL3P3 174 duorum om. R/eius mg. a. m. E/post cum add. omni EP3
 175 post et add. enim P1S/comprehenderit: comprehendit C1P1S 176 remotionum:
 remotio EP3R/visi corr. ex nisi a. m. Er 177 comprehenderit: comprehendit P1S
 178 ymaginabitur: ymaginabit P1 180 et inter. C1/partis . . . mensuram (181) om. P3
 181 anguli om. P1/cui subtenditur (182): quem subtendit C1EErL3P3R 184 remo-
 tionum om. P1RS 185 comprehenderit: comprehendet P1S/percipiet: perciet P1
 186 ante forme scr. et del. e E/forme: fore S/comprehendit: comprehendet C1
 187 quantitatem . . . eius: obliquationis . . . quantitatem P1/obliquationis eius transp. P3
 188 positionem: positiones P1S/eius om. P1 189 viso corr. ex visio Er 190 ratione
 mg. a. m. C1 192 forme: forma P3/visi corr. ex nisi a. m. L3 194 apparentia corr.
 ex apparentie L3 197 visi . . . obliqui: obliqui visi maxime P1S/est: sit R 198 faci-
 alis: superficialis P1S/est¹ om. P1S/manifesta: manifestam L3/est² om. P3

[2.86] Hiis autem declaratis, incipiendum est de sermone
 200 de deceptione visus et declarare causas et species earum.

[CAPITULUM 3]

*Tertium capitulum de causis quibus
 visui accidit deceptio*

[3.1] Declaratum est in ipso primo tractatu quod visus
 nichil comprehendit ex visibilibus que sunt cum eo in uno aere
 5 que recte comprehendit nisi visus congregaverit has intentio-
 nes, et sunt: remotio; [et] oppositio; et lux; et hoc quod corpus
 eius sit aliquantum; et quod sit densum aut habeat aliquam
 densitatem; et quod aer medians inter ipsum et visum sit
 diafonum continue diafonitatis in quo nullum corpus densum
 10 interponatur. Hiis igitur existentibus et visu inspiciente salvo
 ex occasionibus et impedimentis, visus comprehendet illud
 visum. Si autem visus caruerit aliquo istorum, non comprehen-
 det visum quod caret illo.

[3.2] Declaratum est etiam in secundo tractatu quod visus
 15 nullum visibile comprehendit nisi in tempore; ergo et tempus
 etiam est unum eorum que exiguntur ad hoc quod visus com-
 pleatur.

[3.3] Et sanitas visus etiam.

[3.4] Et declaratum est in capitulo predicto quod, cum
 20 visum fuerit extra axem radialem et remotum ab eo, non
 comprehendetur a visu certificata comprehensione, licet sit
 faciale. Et declaratum est etiam quod, si visum fuerit obliqu-
 um super lineas radiales maxima obliuatione, non compre-
 hendetur a visu vera comprehensione, licet sit super axem
 25 radialem et oppositum medio visus. Visus igitur non compre-
 hendit visum secundum quod est, licet sit oppositum ei, nisi
 cum fuerit visum in propria positione, scilicet cum fuerit faci-

199 *post autem add. itaque C1; add. ita P3/incipiendum: insipiendum Er/est om. P1S/*
de: in C1EErL3P3; a R 200 *deceptione: conceptione Er/et¹ om. C1/declarare causas:*
declarandae caussae R 4 *nichil om. VaV2/visibilibus corr. ex visibus O* 5 *recte:*
ratione V2/nisi visus scr. et del. O/congregaverit: congregavit OP1V2 6 *post remotio*
add. et O 8 *sit om. V2* 9 *continue: commune S* 11 *ante et scr. et del. immediatis*
P1/comprehendet . . . non (12) mg. a. m. S/illud: illum O 13 *ante visum scr. et del.*
illud S 15 *comprehendit: comprehendet S* 16 *etiam om. FP1VaV2/unum:*
unus V2 18 *visus om. V2* 19 *et om. P1/post est add. etiam OS/post cum scr. et*
del. s V2 20 *visum: visus O* 21 *post sit scr. et del. i P1* 22 *faciale corr. ex*
facile V2 23 *non om. Va; inter. a. m. V2* 25 *igitur: ergo OS* 27 *faciale (28)*
corr. ex facie O; corr. ex facile V2

ale visui aut fere, et cum fuerit cum hoc super axem radialem aut prope.

30 [3.5] Intentiones autem quibus completur comprehensio visi secundum quod est sunt octo: remotio prima; oppositio; lux; aliqua quantitas corporis; densitas; diafonitas aeris; tempus; sanitas visus. Hiis igitur omnibus aggregatis visum comprehendetur vera comprehensione, et si visum caruerit aliquibus
35 istorum et cum hoc fuerit comprehensum a visu, tunc non comprehendetur vera comprehensione.

[3.6] Dicamus igitur quod unumquodque istorum in respectu uniuscuiusque visibilium habet latitudinem in qua visus comprehendit visum secundum quod est, et dum ista fuerint
40 congregata in visu et unumquodque eorum fuerit in latitudine mediocri secundum quam completur comprehensio visi secundum quod est, tunc visus comprehendet illud visum secundum quod est. Et si unum istorum aut plura uno pertransierint illam latitudinem multum, visus non comprehendet illud visum
45 secundum quod est. Visum enim valde remotum a visu non comprehenditur a visu vera comprehensione, et similiter valde visum propinquum visui non comprehendetur a visu vera comprehensione, et inter duas has extremitates sunt plures remotiones ex quibus visus comprehendit visum vera comprehensione
50 sine dubio. Sed tamen remotiones ex quibus visus comprehendit rem visam vera comprehensione sunt ad aliquem terminum, et nulla earum erat maxima nec in remotione nec in propinquitate; et in unoquoque visibilium sunt secundum illud visibile. Visibile enim magni corporis comprehenditur a visu vera comprehensione in remotione in qua latet visum parvi corporis, et
55 similiter visum fortis lucis comprehenditur a visu ex remotione ex qua latet visum debilis lucis.

[3.7] Et etiam visum quod non est oppositum medio visus sed obliquum a medio maxima obliuatione cuius nulli parti
60 occurrit axis radialis nec propinquat non comprehenditur a

31 sunt *corr. ex* sicut P1/oppositio: positio FSVaV2; *corr. ex* positio a. m. P1 33 ante sanitas *add. et* O/sanitas *corr. ex* sanitatis V2/igitur: ergo S 34 aliquibus (35): aliquid V2 35 post a *scr. et del. us* F 39 post visum *add. illud* OS 41 secundum quam: qua O/comprehensio *corr. ex* comprehensi O 43 post uno *scr. et del. tran* P1/pertransierint: pertransiverint P1 44 post multum *add. tunc* OS 45 quod *inter. a. m. FVa/non . . . visu* (46) *om. P1* 46 comprehenditur: comprehendetur V2/post visu *scr. et del. sola Va/vera comprehensione transp. VaV2* 47 comprehensione (48) *om. VaV2* 48 remotiones (49): intentiones FP1VaV2 50 visus *om. FP1VaV2* 51 ad *inter. O* 52 et *om. V2/earum: eorum O* 54 visibile: visum O 55 in¹ *inter. O/visum inter. O* 58 medio *corr. ex* medium O/visus *corr. ex* visuor P1 59 sed: si V2 60 occurrit *corr. ex* occurrunt O/non: nec FP1VaV2

visu vera comprehensione. Et visum quod comprehenditur duobus visibus in quo non occurrunt axes duorum visuum, et radii consimilis positionis cuius situs apud duos visus non est positio consimilis, non comprehendetur a visu vera comprehensione. Et visum oppositum medio visus super cuius aliquod punctum erit axis radialis aut prope, cum non fuerit maximorum dyametrorum, comprehendetur a visu vera comprehensione, etsi axis non moveatur per omnes eius dyametros. Et visum comprehensum duobus visibus in quo concurrunt duo axes radiales et in quo concurrunt radii consimilis positionis cuius positio apud duos visus est consimilis, comprehendetur a visu vera comprehensione. Et visum faciale visui aut modicum obliquum comprehendetur a visu vera comprehensione, sed parva obliquatio in qua visus comprehendit rem visam certe est secundum intentiones que sunt in viso. Et similiter remotio ab axe radiali parva in qua comprehenditur visum certe est secundum intentiones que sunt in viso, visum enim in quo non sunt subtiles intentiones comprehenditur a visu certe, licet sit extra axem radialem tamen remotum parva remotione. Et similiter comprehenditur certe cum fuerit obliquum super lineas radiales parva obliquatione. Visum autem in quo sunt subtiles intentiones non comprehendetur certe cum fuerit extra axem radialem et fuerit sua remotio ab axe sicut remotio ex qua comprehenditur certe forma visi in quo non sunt subtiles intentiones. Et similiter non comprehendetur forma eius certe si fuerit obliquum super lineas radiales tali obliquatione in illa in qua comprehenditur certe forma visi in quo non sunt subtiles intentiones.

[3.8] Et etiam visum in quo est modica lux et non bene illuminata non comprehendetur a visu vera comprehensione, et maxime cum fuerint in eo subtiles intentiones. Et similiter visum fortiter luminosum et lucidum aut visum tersum super quod oritur fortis lux non comprehendetur a visu vera compre-

61 *ante et scr. et del.* et visum comprehenditur O/*post et scr. et del.* (??) Va 62 quo
om. P1 65 *ante et add.* et visum etiam super quod sunt oblique lineae radiales maxima
obliquatione non comprehendetur a visu vera comprehensione O/*super:* sicut V2
67 *post visu scr. et del.* a P1 68 axis: ante VaV2 70 duo . . . concurrunt *inter.*
a. m. S 72 *post consimilis add.* positionis cuius positio apud duos visus est consimilis
FP1SVaV2 (*scr. et del.* Va) 73 faciale *corr. ex facie* O/*aut:* ad V2 74 obliquatio:
obliquatione P1 76 *post ab scr. et del.* a O 77 certe . . . sunt (78) *mg. a. m. S*
80 tamen: cum V2 85 visi: nisi V2/*non om.* V2 86 forma . . . certe: certe . . .
eius OS 90 illuminata (91) *corr. ex luminata* O 91 *ante et scr. et del.* et inter lucem
fortem et lucem scintillantem sunt plures luces ex quibus V2 94 quod om. P1

95 hensione. Et inter lucem debilem et lucem scintillantem sunt
plures luces ex quibus visus comprehendit rem visam vera
comprehensione. Et etiam lux in qua visus comprehendit for-
mam visi vera comprehensione erit secundum intentiones que
sunt in viso et secundum magnitudinem visi. Visum enim in
100 quo non sunt subtiles intentiones etiam comprehenditur a visu
in parva luce in qua potest latere forma visi habentis subtiles
intentiones. Et similiter visum magni corporis comprehenditur
a visu in parva luce in qua potest latere visum minimum.

[3.9] Et visum etiam, cum fuerit valde parvum et fuerint in
105 eo subtiles intentiones et partes distincte, non comprehendetur
a visu vera comprehensione, ut animalia quorum membra sunt
distincta, et figura membrorum eorum et membra, adeo sunt
parva quod visus non potest comprehendere. Talia enim ani-
malia, si comprehendantur a visu, non certe comprehenduntur.
110 Cum autem corpus animalis est magnum, tunc membra erunt
sibi proportionalia, et tunc visus comprehendet unumquodque
illorum membrorum distinctorum. Et sic comprehendet for-
mam eius secundum quod est. Et similiter omnia visibilia in
quibus sunt intentiones valde subtiles non certe compreen-
115 dentur a visu. Et si ille intentiones fuerint proportionales
visibilibus magni corporis, tunc visus comprehendet illa visi-
bilia vera comprehensione si ille intentiones fuerint propor-
tionales visibilibus.

[3.10] Et etiam cum visum fuerit diafonum et fuerit in eo
120 aliqua densitas parva valde, non comprehendetur a visu vera
comprehensione. Et cum non fuerit diafonum, aut fuerit in eo
parva diafonitas et densitas eius fuerit manifesta, compreen-
detur a visu vera comprehensione. Et quanto magis diafonum
fuerit tenuioris coloris, tanto magis indigebit maiori densitate,
125 et quanto magis fuerit fortioris coloris, tanto magis poterit
comprehendi a visu cum parva densitate cum qua visum tenuis
coloris non poterit comprehendi vera comprehensione. Et
erunt invisibilia que sunt in aere medio inter visum et rem vi-

95 debilem: fortem *FP1SVaV2* 97 post comprehendit *scr. et del. cer P1* 98 erit:
est *O* 99 enim *corr. ex ergo S* 100 etiam: non *O* 101 latere *corr. ex labere V2/*
forma: formam *V2* 103 post latere *scr. et del. forma P1* 105 comprehendetur:
comprehenduntur *P1SVa* 106 ut: et *V2/sunt om. O* 107 sunt parva (108)
transp. VaV2 108 ante talia *add. ea O* 109 ante si *scr. et del. quorum membra sunt*
distincta *V2/comprehenduntur: comprehendetur P1* 110 erunt *om. FP1SVaV2*
112 illorum *corr. ex eorum P1* 114 comprehenduntur (115): comprehendetur *FP1;*
comprehenduntur *VaV2* 115 si *om. VaV2* 116 corporis *corr. ex corpore O*
121 non *om. O* 122 parva *om. FP1VaV2* 124 indigebit: videbit *S* 125 poterit
... non (127) *mg. a. m. S* 126 densitate: diversitate *O* 127 post coloris *scr. et del.*
tenuit *P1* 128 erunt *inter. O/invisibilia: visibilia S*

130 sam cum ille aer fuerit spissus et turbidus, ut sunt nubule, et
fumi, et similia. Et quando illa visibilia sunt subtilia aut fue-
rint in eis intentiones subtiles, non comprehenduntur a visu vera
comprehensione. Et similiter, quando aere in medio interpone-
tur corpus diafonum visui et rei vise in quo corpore fuerit ali-
qua spissitudo, illud visum non comprehendetur a visu vera
135 comprehensione. Si autem aer fuerit clarus diafonus et subtilis
et consimilis diafontitatis, et non interponatur in ipso corpus
densum, tunc visus comprehendet visibilia que sunt in illo aere
vera comprehensione. Et similiter, si in aere fuerit aliqua spis-
situdo parva et fuerint in eo visibilia non minima carentia
140 intentionibus subtilissimis, tunc visus comprehendet illa visi-
bilia vera comprehensione, et non impediatur ab illo aere, licet
sit spissus aliquantulum. Spissitudo autem aeris in quo visum
comprehenditur vera comprehensione est secundum intentio-
nes que sunt in viso, visum enim in quo non sunt intentiones
145 subtiles comprehendetur certe a visu in aere in quo quidem est
aliqua spissitudo in quo aere non comprehendetur certe visum
aliud in quo sunt subtiles intentiones.

[3.11] Et etiam visum, cum fuerit motum motu valde veloci
et cum pertransierit spatium in quo comprehendetur a visu in
150 minimo tempore, non comprehendetur a visu vera comprehen-
sione. Verbi gratia, quando aliquis respicit a foramine a quo
est motus ultra quod aliquod visum movetur motu velocissimo
valde, et comprehenderit visus illud visum ab illo foramine,
tunc visus non comprehendet quiditatem eius, nec certificabit
155 formam eius bene. Si autem fuerit motum in oppositione visus
per spatium non maxime magnitudinis in tempore sensibili,
tunc comprehendetur a visu certe.

[3.12] Et etiam motus velocissimus circularis, ut motus
troci, non comprehendetur a visu, licet trocus comprehendatur,
160 et comprehendet trocum aut corpus motum per motum troci
quasi quiescens. Et similiter motus tardissimus non compre-

129 ut om. VaV2/nubule: nebule OV2 130 quando: quanto P1 131 subtiles om.
FP1VaV2/comprehenduntur: comprehendetur FP1SVa 132 aere in transp. O/in
inter. O 133 visui corr. ex viso O 136 post in scr. et del. ipso F 139 eo:
ipso OS 140 comprehendet: comprehendit Va 141 illo: alio V2; corr. ex illa P1/
post licet scr. et del. licet S 142 autem inter. S 144 ante que scr. et del.
comprehendetur certe S/intentiones subtiles (145) transp. OS 145 in²... aere (146)
om. VaV2/quidem: non O 146 post visum scr. et del. aut P1 147 aliud om. OV2
148 motu om. V2 149 cum om. O/post quo scr. et del. erat Va 152 motu om. V2
154 certificabit: certificat VaV2 156 maxime magnitudinis transp. FP1VaV2/
sensibili: insensibili P1 158 etiam inter. S 160 comprehendet: comprehendat
FP1SVaV2; corr. ex comprehendat O/per motum om. FP1VaV2

hendetur a visu in parvo tempore, et comprehendetur in tempore sensibili quasi quiescens et immobile.

[3.13] Sanitas habet latitudinem. In quadam enim infirmitate minutie corporis visi absconduntur, in minori percipiuntur.

[3.14] Et generaliter quilibet situs in quo non verificatur forma rei vise sicut est in veritate est situs egressus a temperantia ad rem illam proportionata. Egreditur autem situs rei vise a temperamento in longitudine, vel propter maximum longitudinis excrementum vel maximam eiusdem diminutionem. In situ fit egressio a temperantia per maximam ab axe elongationem, per situs corporis respectu duorum visuum diversitatem, per maximam eius declinationem. In luce egressum a temperamento efficit fortitudo eius maxima vel debilitas nimia; in magnitudine diminutio quantitatis rei vise; in soliditate raritatis intentio; in aere nimia eius spissitudo; in tempore nimia eius duratio; in visus sanitate debilitas visus magna vel eius immutatio secundum egritudinem.

[3.15] Habet autem temperamentum latitudinem que sic patebit. Viso aliquo corpore sicut est, et paululum a visu elongato vel adducto, dum videtur distans a veritate insensibili proportionem adhuc est de temperamento, et ita donec proportionalis sit et sensibilis apparentie immutatio. Mensuratur etiam temperamenti latitudo in quolibet istorum secundum proportionem eius ad alia septem, et secundum colorem et partium corporis parvitatem. Igitur, latitudo temperamenti longitudinis attenditur et secundum colorem, et secundum minutias que in corpore fuerint, et secundum lucem et sex alia que dicta sunt.

[3.16] Secundum coloris varietatem, quoniam corpus fortis et acuti coloris a maiori longitudine percipitur quam obtusi et

164 *post sanitas add. autem C1/habet latitudinem transp. C1/quadam corr. ex quadam Er* 165 *visi: nisi EP3* 167 *a temperantia (168): ad temperantiam P3*
 168 *post rem add. visam R/post illam add. visam P15/autem situs transp. Er*
 169 *propter: per P1* 170 *eiusdem: eius R/post eiusdem scr. et del. in C1/diminutionem (171): diminutione S* 171 *egressio corr. ex regressio L3* 172 *per: quod EP3/post visuum add. per C1* 173 *ante per add. et C1/eius: eiusdem Er*
 174 *temperamento: temperantia EP3R/eius maxima transp. ER* 175 *nimia: minima P1* 177 *nimia: minima R; alter. in minima a. m. C1/post nimia scr. et del. est L3/visus¹ om. R/magna: maxima C1EL3P3R* 180 *sicut est om. R/et: etiam Er; inter. C1/paululum: paulatim P3L3; corr. ex paulatim a. m. C1E* 181 *elongato: elongatio Er; corr. ex elongatio P3/dum corr. ex deinde L3/a: in C1* 183 *apparentie corr. ex apparente a. m. C1; apparentem L3/immutatio: mutatio EL3P3R* 184 *etiam: et P15/quolibet: quodlibet EP3* 186 *et inter. L3/parvitatem corr. ex quantitatem C1* 187 *et¹ om. C1/et² om. S/post secundum² add. etiam S* 188 *post corpore add. priore P1/fuerint: fuerunt P1* 190 *post secundum add. etiam C1* 191 *obtusi: obscuri R*

debilis, unde latitudo temperamenti longitudinis maior est proportionata ad colorem fortem quam ad debilem.

[3.17] Similiter si fuerint in corpore viso note notabiles, a
195 maiori longitudine comprehenduntur quam si multum parve,
unde maior est longitudinis temperantia respectu partium corporis notabilium quam respectu minutarum.

[3.18] Pari modo maius erit temperamentum longitudinis
ad rectam corporis oppositionem proportionatum quam ad
200 eius declinationem. Similiter erit maius secundum propinquitatem corporis ab axe quam secundum elongationem.

[3.19] Eodem modo, maior est temperamenti longitudinis latitudo in forti luce quam in debili.

[3.20] Et maior si corpus visum fuerit magnum quam si
205 parvum.

[3.21] Similiter corpus multum solidum a maiori longitudine percipitur quam minus solidum, unde soliditati corporis proportionatur longitudinis temperamentum.

[3.22] Ad qualitatem aeris proportionatur temperamentum
210 longitudinis, quoniam spissitudo aeris ab aliqua longitudine corporum visui abscondit que ab eadem vel a maiori longitudine claritas exponit.

[3.23] Temporis quantitati proportionatur temperamentum
longitudinis, quoniam in tempore aliquo motus corporis
215 percipitur ab aliqua longitudine et a maiori percipietur in maiori tempore.

[3.24] Pari modo in aliquo modo santitatis visus a maiori longitudine videbitur corpus quam in minori.

192 longitudinis: latitudinis P1S 193 post proportionata add. magis R/ad² om. C1; inter. L3 194 corpore . . . note corr. ex viso . . . corpore Er/notabiles corr. ex notabilis Er 195 longitudine: latitudine Er/comprehenduntur: comprehenduntur EP3; corr. ex comprehenditur a. m. C1L3 196 est om. EEerL3P3R; nig. a. m. C1/longitudinis: latitudinis P1S/partium om. S 198 post pari add. vero L3/modo inter. a. m. L3/erit: est R/longitudinis: latitudinis P1S 199 proportionatum: propositum P3; corr. ex propositum a. m. E/quam: quod EP3 201 secundum om. EP3R/elongationem: declinationem C1L3 202 temperamenti: temperati P1 203 latitudo inter. L3 204 post maior add. est latitudo C1S (inter. a. m. S)/post corpus add. visus Er/visum om. P1 206 maiori: maiore R 207 soliditati: solidati P1P3S 208 longitudinis: latitudinis P1; corr. ex latitudinis a. m. S 209 post temperamentum inter. cum L3 210 longitudinis: latitudinis P1; alter. in latitudinis a. m. S/post spissitudo add. corporis C1L3/longitudine: latitudine P1; corr. ex latitudine a. m. S 211 corporum: corpora C1EErP3R; corporea L3/post que scr. et del. ab S/a om. P1/longitudine (212): latitudine P1; alter. in latitudine a. m. S 213 temperamentum corr. ex temporum L3 214 longitudinis: latitudinis P1; corr. ex latitudinis a. m. S 215 longitudine: latitudine EEerP1P3; corr. ex latitudine C1L3S (a. m. C1S)/maiori: maiore R/percipietur: percipitur L3 216 maiori: aliquo P1; maiore R 217 post modo¹ scr. et del. in aliquo L3/modo²: statu C1EErP3R; corr. ex statu L3/a maiori: in maiore R 218 longitudine: latitudine P1S/quam corr. ex quem a. m. C1

[3.26] Similiter mensuratur temperamentum situs secundum proportionem factam ad longitudinem, ad colorem, ad minutias corporis, ad lucem, et ad alia que enumeravimus.

[3.33] Et tu considera et singulis adapta, et videre poteris defacili. Et eodem modo proportionabis temperamentum cuiuslibet istorum ad omnia alia, et videbis quod dictum est per singula.

[3.34] Quando ergo singula eorum que enumerata sunt fuerint in latitudine temperamentum sui, apparebit rei vise veritas forme sicut est in re. Quando autem non apparet forma sicut est in veritate, egressum est aliquid predictorum a temperamento aut plura eorum. Igitur causa quare errat visus in comprehensione formarum non est nisi egressus alicuius predictorum a temperamento aut plurimum, et hec dicenda in hac erant parte.

[CAPITULUM 4]

[4.1] Planum est ex libro secundo quod rerum fit comprehensio per sensum, scientiam, sillogismum. Cum autem accidit error in eis quorum fit comprehensio per solum sensum, scimus quod est error sensus tantum. Cum in eis que per scientiam comprehendit quis erraverit, in scientia tantum error erit. Si vero in his que per sillogismum comprehenduntur erret quis, erit error in sillogismo tantum. Sensus acquirit lucem et colorem tantum, sicut dictum est.

[4.2] Scientia vero pretendit ea que prius sunt visa et in sensu habita, ut lux solis cognoscitur quod plurimum visa est, et inter lucem solis et lucem lune discernitur. Et licet fiat comprehensio lucis per sensum tantum, tamen per scientiam acci-

220 longitudinem: latitudinem *EErP1P3*; *corr. ex latitudinem L3S (a. m. S)* 221 enumeravimus: numeravimus *C1L3* 222 et²: de *C1/post singulis scr. et del. ada P1* 223 defacili: de facili *Er*; facile *R*/proportionabis: probabis *EP3* 226 que enumerata *corr. ex enumerata que S* 227 fuerint: fiunt *L3/rei . . . forme (228): veritas forme rei vise R* 228 est *om. L3/post re add. visa C1* 229 post est² *add. vel C1EErL3P3R/aliquid: aliquid C1EErL3P3R* 230 causa quare *transp. P1/errat: erret R; corr. ex erat L3* 232 plurimum: plurium *C1EL3; alter. in plurium Er* 233 in hac erant: erant in hac *P1* 1 est *om. C1ErL3/rerum fit comprehensio (2): comprehensio . . . fit R* 2 ante per *add. tripliciter C1* 3 eis: hiis *EP3R* 4 scimus quod *om. P1S/sensus corr. ex sponsus P1/post cum add. vero R/eis: ijs R* 5 comprehendit: comprehendet *S/post tantum scr. et del. err C1* 6 erret *alter. ex erit in erit a. m. L3* 9 pretendit: precedit *S* 10 sensu: visu *C1EErL3P3/ut: inde EErP3; unde C1/ante lux scr. et del. vel inde C1/est: sit R* 11 et¹ *inter. L3/lucem² om. R/lucem lune transp. C1/lune: lumine E; corr. ex lumine L3P3/discernitur: decernitur EP3/post discernitur add. per scientiam C1S (inter. a. m. S)* 12 post sensum *scr. et del. lucis L3/tamen corr. ex quando C1*

dit distinctio lucium. Similiter accidit per scientiam notitia
 figurarum, ut trianguli, quadrati, circuli, et aliarum similium.
 15 Similiter notitia asperitatis, lenitatis, umbre, decoris, et simili-
 um, per sillogismum fit comprehensio eorum, que supra expla-
 navimus, licet ea non plurimum noverit sensus.

[4.4] Omnis autem comprehensio rerum continetur sub ali-
 quo horum trium modorum, et cum error evenit in comprehen-
 20 sione formarum, non accidit nisi in aliquo istorum.

[4.5] Accidit error sensui si corpus in quo sit multa color-
 um particularium diversitas occurrat visui sub luce multum
 debili, ut vestis aliqua diversis coloribus et in minutis picturata
 apparebit unius coloris. Et erit error in sensu per lucem a tem-
 25 peramento suo egressam, ceteris a temperantia non egressis.

[4.6] In scientia error accidit cum in magna longitudine
 videtur aliquando homo notus existimatur esse alius similiter
 cognitus, unde ab aliqua longitudine videns fratrem putat se
 videre patrem vel aliquod in hunc modum. Et est error in
 30 scientia propter egressum solius longitudinis a temperamento.

[4.7] In sillogismo accidit error, ut quando motis nubibus
 existimatur esse lune motus. Et accidit error iste ex intempera-
 ta longitudine, quoniam nisi longitudinis est temperantia non
 evenit, ita ut baculum hic fundo aque infixum, et aquam super
 35 eminentem in motu videmus, sed non lignum, et motum aque
 transeuntis percepimus.

[4.8] Accidit autem error predictus in motu lune cum nubes
 fuerint multe et continue, et causa eius est quoniam, sicut pat-
 uit superius, non comprehenditur motus nisi per accessum
 40 alicuius ad aliud vel recessum consideratum. Cum ergo pauci-

13 lucium: lucis C1EL3P3R/post lucium add. et C1L3 14 aliarum alter. in aliorum
 a. m. C1 18 continetur: comprehenditur Er/aliquo (19): alio Er; corr. ex aliqua L3
 19 horum trium transp. C1L3/evenit: accidit R 21 accidit: accidet C1 22 occur-
 rat: occurrit EP3/visui: sensui P1S 23 ut: aut C1; corr. ex aut L3/in om. C1EErL3P3R
 24 et. . error mg. a. m. S (error: heror)/per: propter C1EErL3P3 26 in²: a Er; om. P3;
 inter. L3/longitudine: latitudine P1; corr. ex latitudine a. m. S 27 homo notus transp.
 C1/notus corr. ex motus P3/post existimatur add. homo P3 28 post aliqua scr. et del.
 sum solius longitudine a temperamento Er/longitudine: latitudine P1S/se om. P3
 29 aliquod: aliquem C1EP3R; alter. in aliquem L3 30 longitudinis: latitudinis P1S
 32 esse lune transp. P1/intemperata (33): temperata P1 33 longitudine: latitudine
 P1S/post quoniam add. quando R/nisi: ubi P1; visi R/longitudinis: latitudinis P1S
 34 ita ut alter. in ut L3/post ita scr. et del. baculum hic in aliquo loco fundo aque infixum
 et aquam super venientem in motu etiam motum videmus seu lignum alia linea C1/ut
 om. Er/hic om. R 35 eminentem: venientem C1/post motu add. etiam immotum
 EP3R; add. etiam motum ErL3/sed non: seu EEerL3P3/sed . . . lignum om. R/aque
 transeuntis (36) transp. C1EL3P3R 36 percepimus: percipimus EL3 37 motu:
 motis L3 38 fuerint: fiunt L3 39 comprehenditur: comprehenduntur Er

tas fuerit nubium, possumus discernere motus earum propter uniuscuiusque ad stellam aliquam accessum apparentem aut recessum. Cum ergo celum nubibus fuerit coopertum, propter
 45 continuitatem earum non discernimus motum; verumtamen lunam modo in parte una videmus, modo in alia, unde ipsam motu celerrimo moveri concludimus. Eodem modo erit error per situm a temperamento egressum.

[4.9] Et per unumquodque octo supra dictorum est comprehensio per sensum, per scientiam, et per sillogismum.

[CAPITULUM 5]

*Pars quinta, in modis erroris visus propter
 sensum ex qualibet causarum errorem
 sensui inducentium*

[5.1] Ex predictis palam quod non est comprehensio per
 5 sensum nisi lucis et coloris tantum. Non ergo accidit error sensui nisi in luce et colore, nec accidit error per lucem aut colorem nisi propter intemperatam debilitatem eius aut fortitudinem, vel propter colorum minorum diversitatem et debilius. Et hec colorum diversitas in luce debili venit ad oculum tamquam
 10 aliquid obscurum et tenebrosus, et etiam in luce forti, quando substantia colorum fuerit valde parva.

[5.4] Longitudo inducit errorem sensus. Cum temperata fuerit elongatio corporis a visu, et fuerint in corpore partes minute in coloribus diverse ad quas proportionata partium
 15 elongatio sit intemperata, apparebit corpus illud unius coloris tantum, quoniam extra temperantiam est longitudo respectu

41 discernere: decernere EP3/earum: eorum P3 42 uniuscuiusque: unicuiusque E/
 ante ad add. nubis C1/stellam: similem P1; corr. ex syllogismam a. m. Er; corr. ex similem
 a. m. S/aliquam: aliquem P1S/aut corr. ex et a. m. C1 43 ergo: vero C1EErL3P3R
 44 continuitatem: concavitatem P1/discernimus: decernimus EP3 45 parte una
 transp. EP3 48 est comprehensio (49): in comprehensione C1EErL3P3R 49 per³
 om. C1 1 pars . . . inducentium (3) om. ErP1R/quinta inter. a. m. C1 3 sensui:
 visui C1L3S 4 post palam add. est ErP3/quod om. L3; inter. C1/est: fit C1EErL3P3R
 5 accidit error transp. R/error om. S 6 post colore add. tantum R/error om. C1EL3P3R
 7 intemperatam corr. ex temperatam a. m. E; corr. ex intemperantam P3/aut: vel P3
 (mg. a. m.) 8 vel: aut P1/propter om. P1S/diversitatem et debilius: debilius et
 diversitatem R 9 colorum: corporum C1EErL3P1P3S 10 aliquid: ad P1S/
 obscurum corr. ex obsti P3/et¹: aut C1EL3P3 11 colorum fuerit: oculorum est P1S
 12 temperata: intemperata C1; alter. in intemperata L3 15 intemperata: temperata
 P1S; corr. ex temperata a. m. E/post intemperata add. et L3/post apparebit add. enim R
 16 longitudo: latitudo P1; corr. ex latitudo a. m. S

particularium, licet omnia alia convenient in temperantia. Et est error iste sensualis cum sensus comprehensivus sit coloris.

[5.7] Situs sensum errare facit. Cum maxima fuerit corporis
 20 is visi declinatio, occultabuntur visui minute eius particule. Et si fuerit in partibus minutis colorum diversitas, apparebit in totali corpore colorum unitas. Et accidit error propter situm tantum, quia opposito corpore visui in situ recto aliis sicut sunt immotis, percipientur et partes corporis et coloris cum
 25 solus situs egressus sit a temperamento. Idem error accidit ex situs intemperantia cum elongatio partium minutarum ab axe fuerit magna.

[5.8] Lux multum debilis errorem facit. Abscondit enim visui particulas corporis, et pretendit unitatem tenebrosi coloris.
 30 is. Et si lux ad temperantiam reduceretur, diversitas colorum aut diminutio partium non occultaretur quando lux sola extra temperantiam est sita.

[5.9] Magnitudo errorem invehit. Cum partes corporis minutissime dissimiles fuerint totali in colore, latebunt visum
 35 partes ille propter sui parvitatem, et similiter eorum colores. Et apparebit color unicus in corpore, magnitudine sola extra temperantiam sita, quod non appareret si parvitas partium temperamentum non exiret.

[5.10] Soliditas causa est erroris sensualis si remissa fuerit
 40 soliditas, ut in cristallo, unde cum superponitur ei corpus coloratum, videtur cristallum colore illo affectum propter soliditatis parvitatem a temperamento egressam, quod non accideret si cristallum magis solidum esset.

[5.11] Ex raritate aeris procedit error sensualis. Cum intercidit visum et corpus oppositum flamma, licet fortis coloris
 45

17 particularium: particularum C1; corr. ex particularum L3/alia: altera P3; inter. a. m. E/convenient: conveniat Er 18 comprehensivus: comprehensio L3/comprehensivus sit transp. C1EErL3P3R/ante sit add. unius C1L3 (scr. et del. C1) 19 post facit add. et P3/post cum add. eis P1; add. enim S 20 post visi scr. et del. et L3/visui om. Er; inter. L3/et: sed C1 21 fuerit . . . minutis: in partibus . . . fuerit C1EErL3P3R 23 post in scr. et del. recto S/recto corr. ex recedere a. m. C1 24 et¹: etiam R 25 solus corr. ex solius L3/idem: item P1P3 26 intemperantia corr. ex temperantia E 28 post facit add. et P1S/enim om. P1S 30 reduceretur: rediret P1S 31 non inter. L3/occultaretur corr. ex occultarentur P1/quando: quoniam C1EErL3P3R 33 invehit: inducit C1/post cum add. enim EP3R 34 totali in transp. C1EL3P3R 35 sui: suam R 36 et om. Er 37 appareret: apparet EErL3P1P3S/post partium add. extra R 39 est erroris transp. Er 40 superponitur: supponitur EErL3P1P3RS; alter. in superponitur a. m. C1/superponitur ei transp. EP3R 41 cristallum: crystallus R/colore illo transp. P1/affectum: affecta R 42 egressam om. P3 43 cristallum: crystallus R/solidum: solida R 44 intercidit (45): interciderit C1L3; inciderit P3 45 ante visum add. inter R

sit corpus visum, videbitur tenebrosus, et sola aeris raritas egressa est temperamentum.

[5.12] Tempus est causa erroris. Quoniam, si subito super corpus diversorum colorum fiat visus directio, apparebit color singularis donec prolongetur inspectionis duratio, luce dico sub qua comprehenditur corpus non forti.

[5.13] In luce enim debili non statim immutatur visus secundum quemlibet colorum particularium, quod accideret in luce forti.

[5.14] Visus aliquando errorem pretendit. Luce enim forti in visu cadente, leditur visus, et statim ad colorem alicuius corporis conversus ipsum tenebrosus recipit donec paululum steterit et lesio recesserit. Pari modo, cum aderit oculis infirmitas, occultabitur visui colorum veritas, unde error fit ex sola visus qualitate a temperamento recedente.

[5.15] Patet ergo quod accidunt errores visui secundum quodlibet predictorum considerati, et accidunt in sensu tantum cum ex solo sensu fiat comprehensio colorum.

[CAPITULUM 6]

Pars sexta in modis erroris visus per scientiam accidentis per quamlibet causarum errorum visus

[6.1] Dictum est in libro secundo quod non nisi per scientiam fit diffinitionis rei adquisitio. Provenit enim diffinitio ex similitudine vel dissimilitudine alicuius rei cum alia in comuni forma.

[6.2] Et proprium est scientie communicare rem visui presentem cum re prius visa in forma recepta, et ex hac communicatione acquiritur diffinitio rei cuiuscumque. Diversificatur

46 aeris raritas *transp. R* 47 est *om. P3* 48 est *inter. L3/* causa *corr. ex tam P1/* quoniam: quando *C1* 53 quemlibet: quodlibet *L3P1S; corr. ex quodlibet a. m. C1/* colorum: colorem *EP3* 55 aliquando: autem *C1L3* 56 visu: visum *C1R/* cadente: carente *L3; corr. ex agente a. m. C1* 57 recipit *corr. ex respicit Er/* paululum: paulatim *C1L3* 58 pari *corr. ex parit L3/* oculis: oculi *R; corr. ex oculus Er* 59 fit: est *C1EErL3P3R* 60 post visus *scr. et del. a Er* 61 quod *om. Er* 62 considerati: consideranti *EL3/* accidunt: accidit *EL3P3; corr. ex accidit C1* 1 pars... visus (3) *om. C1L3P1R; mg. EEerP3 (a. m. EEer)/* erroris *corr. ex errorum Er* 2 per: secundum *ErS* 3 causarum *corr. ex causam Er* 4 in *inter. a. m. E/* libro secundo *transp. EP3R* 5 provenit: pervenit *EL3P3R/* provenit enim *corr. ex pervenitur et certitudo cognitionis a. m. C1/enim om. L3* 6 dissimilitudine: assimilitudine *Er* 8 scientie *corr. ex scientia L3/* ante rem *scr. et del. vel* communicare *L3* 9 communicatione (10): coniunctione *Er*

autem scientia in scientia individui et universalis, aut utriusque, et omnis error scientie erit error in aliquo istorum aut in utroque.

[6.3] Cum ergo res aliqua aut alia aut alterius speciei apparet quam sit in rei veritate, erit error in diffinitionis assignatione, nec accidit error iste nisi aliquod istorum predictorum fuerit extra temperamentum.

[6.4-5] Error enim scientie in longitudine erit. Si a longitudine magna videatur homo notus, apparebit forsitan esse alius videnti notus, unde aliquando videns Petrum visum dicit esse Martinum, cum constet utrumque ei esse notum.

[6.6] In forma communi erit error. Si quis ab aliqua longitudine videat equum et putet se videre asinum, in utraque formarum—scilicet singularis et communis—est error, ut si quis a longitudine magna videt equum sibi notum et existimat se videre asinum sibi cognitum. Pari modo accidit error in arboribus triplex: in individuis, in communibus formis, in utrisque. Unde aliquando una amigdalus existimatur alia; aliquando a longitudine magna pirus magna apparet amigdalus; aliquando pirus Petri apparet amigdalus Martini. Eadem triplicitas erroris ex longitudine accidit plurimum in vestibibus, lapidibus, et aliis.

[6.7] Aliquando videtur res incognita et contingit error in scientia, sicut si aliquis ignem viderit longe remotum in aere, existimat se stellam videre. Planum autem quemlibet errorem predictum cadere in scientiam cum in eo fiat assignatio diffi-

11 autem *om.* L3/scientia²: scientiam R/individui: ydee C1EErL3P3R/et *om.* C1EErL3P3R/post et *add.* forme communis P1S (post forme *scr.* et *del.* in P1)/post universalis *add.* aut singularis C1EErL3P3R 12 scientie: scientia EP1/erit *rep.* P1/aliquo *corr.* ex aliquid a. m. C1/aut *corr.* ex ut P3 14 aliqua *alter.* in alia *deinde corr.* ex alia a. m. C1/apparet (15): appareat C1 15 diffinitionis: diffinitionum P1S 16 nec: non P1; *inter.* L3/accidit: accidat L3/post accidit *add.* autem P1/aliquod: aliquid C1P1/istorum *rep.* P1; *om.* C1EErL3P3R/predictorum *om.* P1S 17 temperamentum *corr.* ex temperamento L3 18 enim *om.* C1EL3P3R/enim scientie: in scientia Er/in longitudine: propter longitudinem C1 19 notus: motus EP3/forsitan: forte P1/esse *om.* P3 20 notus: motus P3; *corr.* ex motus a. m. E/unde: unum S 21 post utrumque *scr.* et *del.* erit enim notum C1/ante ei *mg.* videnti a. m. C1/ei . . . notum *mg.* a. m. C1 23 in . . . asinum (26) *mg.* a. m. S/in ? S 24 est: erit C1/error ? S 25 magna: maxima C1EL3P3R/videt: videat R; ? S/existimat: aestimet R/se *om.* C1L3 27 in¹ *om.* P1S/communibus *corr.* ex communis S 28 amigdalus *corr.* ex amigdalus S/aliam *corr.* ex alius a. m. C1/aliquando²: a natura P1 29 pirus: prius S; *corr.* ex prius E/magna *om.* EErL3P3R/apparet: aestimatur R/aliquando: a natura P1 30 post Petri *scr.* et *del.* a C1/apparet: creditur C1EErL3P3R 31 post vestibibus *add.* in P1 33 aliquando: a natura P1/incognita: ignota C1EErL3P3R 34 sicut: si cum C1EL3P3; sed cum Er/ignem viderit *transp.* EErP3R 35 post existimat *add.* forsitan C1EErL3P3R/autem: ante Er 36 in² *om.* L3

nitio[n]is rei vise que non est in ea veritate. Palam etiam quod
accidit error prefatus ex longitudine extra temperantiam exe-
unte. Ea enim ad temperamentum reducta, aliis erroris et
40 causis, sicut sunt, manentibus, non accidit error in scientia
predictus.

[6.8] Situs errorem infert scientie. Cum corpus aliquod
multum fuerit elongatum ab axe, non erit certa forme compre-
hensio. Unde aliquando in hoc situ Petrus existimabitur Mar-
45 tinus; aliquando equus putabitur esse asinus, sicut in arboribus
et vestibus; aliquando equus notus putabitur Brunellus. Et in
hac incertitudine fors[er]im eligetur veritas, fors[er]im falsitas. Cum
enim incertum sit in hoc situ iudicium, casualis erit electio.

[6.9] Accidit autem error ex intemperamento situs, quoni-
50 am, ipso ad temperantiam reducto, non errabit iudicium ex
scientia sumptum.

[6.10] Pari modo in magna corporis declinatione non veri-
ficantur particule minute, unde accidit in hoc situ error figure,
coloris, magnitudinis; fors[er]im enim quadratum videtur circulare,
55 et ita in quantitate et colore.

[6.11] Egressio lucis a temperamento errorem inducit scien-
tie. Debilitas enim lucis nimia errorem infert forme, unde ac-
cidit error in crepusculis in animalibus, vestibus, arboribus—
scilicet triplex: vel in individuo, vel in specie, vel in utroque—
60 quod non accideret in temperata luce.

[6.12] Amplius, si fuerit egressus lucis a temperamento,
proportionato viso opposito visui, accidit error predictus, licet
non sit intemperata in se lux, sicut evenit in quadam ave ara-

37 *post ea add. in EErP3R/veritate corr. ex vertitate S/etiam alter. in ergo a. m. C1*
38 *temperantiam: temperamentum R 39 erroris: ex formis P1S/et om. C1EErL3P3R*
40 *sicut corr. ex sint C1/accidit: accidet C1ErL3S/scientia om. P1 41 predictus:*
predictis P1P3 42 cum corr. ex ut C1 (mg. a. m.) 43 multum corr. ex punctum P1/
fuerit scr. et del. P3 44 aliquando: a natura P1/existimabitur: existimabatur P1
45 *aliquando: a natura P1/post equus scr. et del. existimabitur L3/putabitur: existimabitur*
C1EL3P3R/esse om. C1/sicut: sic EErP3/sicut . . . Brunellus (46) om. R/post sicut add.
etiam C1 46 aliquando: a natura P1/notus: motus Er/Brunellus: Burnellus C1ErL3P1S
47 *incertitudine: certitudine P1/forsan²: forte P1; forsitan S 48 incertum: certum*
P1S/incertum . . . situ: in hoc situ . . . sit R/situ: statu EP3R/erit electio transp. EP3R/
electio: electo Er 49 ex corr. ex in C1 50 temperantiam: intemperantiam ErS; corr.
ex intemperantiam C1L3 52 ante non add. nisi S/non . . . minute (53) om. P1/
verificantur (53): vertificantur Er 53 post particule add. in C1 54 videtur om.
C1EErL3P3 55 ante et¹: add. putabitur C1/post ita add. error R/post colore add. fit
error C1 56 lucis rep. Er/post lucis scr. et del. et coloris P1 57 lucis nimia transp.
C1L3/infert forme corr. ex forme infert P1/accidit error (58) transp. C1L3 59 in¹ om.
ErL3P1P3S 60 accideret: accidet P3 62 proportionato: proportionate C1EErL3P3;
corr. ex proportionatio S/viso: visui C1EErL3P3/visui om. C1EErL3P3/accidit: accidet
C1EErL3P3R/predictus corr. ex predictis P1

bice aluerach dicta. Non enim videri potest nisi de nocte.
 65 Tamquam ignis de die vero, cum non plene discernatur, forsán
 papilio cui est similis putabitur. Et sic accidit error in diffini-
 tione rei ex intemperata luce.

[6.14] Quantitas extra temperantiam suam errare facit sci-
 entiam, unde aliquando formica pre sui parvitate existimatur
 70 musca tritico innata, et aliquando eadem causa sinapis gra-
 num reputatur nasturtium.

[6.16-17] Soliditas a temperamento egressa errorem efficit.
 Cum cristallo continuatur corpus rubeum, alia cristalli facie
 visui opposita, existimabit videns colorem cristalli esse rube-
 75 dinem, unde error est scientie, quia in coloris diffinitione.

[6.18] Raritas aeris nimis diminuta erroris est causa, unde
 in eius spissitudine fit error in rei diffinitione. Similiter, si ocu-
 lo et corpori viso interponatur corpus cuius raritas extra tem-
 perantiam est respectu raritatis aeris temperate, sicut est vit-
 80 rum, existimabitur color corporis oppositi mixtus ex colore
 proprio et colore vitri. Et est iste error in coloris diffinitione.
 Pari modo, si anteponatur oculo pannus multum rarus et post
 illum videatur corpus, apparebit color corporis mixtus.

[6.20] Sed oritur questio quomodo post panni oppositio-
 85 nem appareat coloris corporis oppositi mixtura cum partiales
 corporis colores non accedant ad oculum nisi per panni fora-
 men, et ex panno non accedat ad oculum color nisi ex filis eius
 per que non transit color corporis.

[6.21] Et huius rei veritas est quod, licet partiales corporis
 90 colores singillatim veniant, et in sua loca cadant, nec commis-

64 dicta: dicte C1EErL3P3/post nocte add. egreditur enim lux a temperamento respectu
 illius percipitur autem de nocte C1EErL3P3R 65 tamquam: sicut R/cum non: non
 sit EP3/discernatur: deducta EP3/post discernatur add. et L3/forsan alter. in forsitan P1
 66 sic om. C1EErL3P3R 68 post quantitas add. ergo C1L3/suam: sita C1EErL3P3R
 69 aliquando: a natura P1/pre: propter P1/parvitate: parvitatem P1; corr. ex parvi-
 tata P3 70 tritico innata: tertio villata P1/et om. ErP1S/post aliquando add. in C1L3
 (scr. et del. L3)/post eadem add. de R 72 post efficit add. ut C1EErL3P3R 75 est
 om. C1L3/quia: accidit C1 76 post raritas add. autem C1L3/unde om. P3 77 post
 eius add. enim P3/si: in Er 79 est¹ om. ErP1S; inter. L3/raritatis... temperate: aeris
 ... raritatis EP3R 81 colore: colori L3; corr. ex colori a. m. C1/post vitri scr. et del. cata
 est C1/et est iste mg. a. m. C1/est iste: ita est EErL3RS/est iste error: ita error est P3
 83 post corpus add. et L3 84 questio inter. L3/post quomodo scr. et del. post P1
 85 oppositi: oppositioni P1S; om. EP3R/partiales: partialis EP3 86 corporis colores:
 coloris corporis C1EErL3P3/non om. EErL3P3R; mg. a. m. C1/post non add. colores
 C1EL3P3 (post colores mg. non a. m. C1)/post oculum add. non C1EErL3P3R/panni fora-
 men (87) transp. C1/foramen (87): foramina R 87 accedat: accidit EP3; accedet Er;
 accedit L3/color om. P3/eius om. P3 88 transit color: transeunt colores C1EL3P3R
 89 huius: huiusmodi Er; rep. P3 90 singillatim: sigillatim EP1P3RS/commisceantur
 (91) corr. ex commiscentur C1

ceantur filorum coloribus, sed filorum colores sint ab eis separati intra visum et extra, nec sit ibi aliqua confusio, tamen, quia valde propinqua sunt puncta in que incidunt color corporis superficialis et color fili, cum non sit distantia sensibilis inter ea, 95 videntur quasi punctus, unde colores illi apparent unus ex eis mixtus.

[6.22] Si autem magna sint panni foramina, discernetur et panni et coloris corporis veritas sine mixtura, et quanto compressior fuerit foraminum strictura verior apparebit mixtura, 100 unde viso corpore post pannum lane videbitur mixtura colori plurimum consonans colorum filorum. Foramina enim panni lanei sunt in se stricta, et quoniam pilis panni teguntur, efficiuntur et strictiora.

[6.23-24] Aliud erroris ex raritate exemplum cum aliquis 105 ioculator facit ymagineas lineas moveri, umbre earum inspicienti per pannum, sicut solet fieri lineum subtilem, apparebunt aves aut animalia formis ymaginum consona, nec accidit error iste in diffinitionis assignatione nisi ex raritatis aeris diminutione.

[6.25] Temporis distantia preter temperamentum erroris 110 scientie est causa. Si quis per foramen inspiciat corpus transiens veloci motu, non plene adquirit formam corporis, unde accidet error in individuo, in specie, vel in utroque, ut in equis, hominibus, arboribus. Similiter accidit etiam sine foramine; si 115 quis subito aliquid videat quod statim a visu recedat errabit in comprehensione illius forme, unde forsitan erit error in specie, individuo, vel utroque. Et erit error iste in solo tempore.

[6.27] Visus solus errorem facit. Si lux solis fortis descen-

91 coloribus *corr. ex. corporibus Er* 92 ante intra *scr. et del. sint L3* 94 color fili: colorum filiorum *P1/fili: filii S* 95 illi: ibi *R* 97 autem: vero *R/sint: fuerit R/discernetur corr. ex discernatur P3* 98 coloris *corr. ex colores C1/quanto: quando Er/compressior (99): comprehensior C1 (mg. a. m.); corr. ex comprehen S* 99 strictura: structura *EP3; statura P1/post strictura add. tanto R/mixtura corr. ex structura E* 100 viso *corr. ex visio P1* 101 enim *om. P1* 102 lanei *corr. ex lae L3/sunt in se: in se sunt C1EErL3P3R/panni om. C1EErL3P3R/teguntur: tanguntur P1* 103 ante et *scr. et del. a L3/et: etiam Er; om. C1EL3P3R* 104 aliud . . . exemplum: similiter *R/erroris corr. ex errans P1* 105 ligneas *corr. ex lineas P3/inspicienti (106): inspiciendo C1* 106 lineum *corr. ex ligneum a. m. P3* 108 post aeris *scr. et del. diffi P1* 110 distantia: instantia *EErP3; corr. ex instantia C1L3 (a. m. C1)/preter: extra R* 111 post quis *add. enim C1EErL3P3R/corpus mg. a. m. C1* 112 adquirit: acquirit *C1EL3P3R* 113 accidet: accidit *C1EL3P3R/in¹ om. P1/vel: et C1; om. EErL3P3R/ut: aut S/post equis add. in C1L3* 114 post hominibus *add. et R; add. et in C1EL3P3/post similiter add. autem EP3; add. etiam R/accidit: accidet Er/etiam: et P3; om. P1R/ante si add. ut R* 115 quod *corr. ex post a. m. C1/errabit: eiusdem Er/in: cum P1S* 116 forsitan: forte *P1/in om. P1S/post specie add. in EErP3R* 117 post vel *add. in RS/in: ex C1EErL3P3R* 118 fortis: fortiter *C1EP3R*

120 dat super colorem viridem fortem vel intensam rubedinem,
adhibito visu, ledetur. Et cum aliquid deinceps inspexerit,
aliud quidem ei quam sit in veritate apparebit, aut alterius
coloris, propter presentiam lesionis. Et modo simili accidunt
errores plurimi.

[6.29-30] Pari modo in oculorum egritudine aliquando equ-
125 us apparet asinus, et accidit error triplex predictus et in pluri-
bus. Et planum est errorem esse in scientia ex sola immoder-
antia visus.

[6.31] Palam ergo sunt errores qui in visu scientie accidunt
secundum singulas erroris visus causas.

[CAPITULUM 7]

*Pars septima in modis erroris visus qui
accidunt in sillogismo secundum
singulas erroris visus causas*

[7.1] Plurima eorum quorum in visu sit comprehensio ad-
5 quiruntur ex sillogismo, sicut patuit ex precedenti libro, et
precessit explanatio eorum quorum per sillogismum sit com-
prehensio et quod ex eis occurrat sensui compositio in formis
singulis. Cum ergo accidit error in aliquo illorum, erit error in
comprehensione facta per sillogismum. Bipartita est autem
10 partitio erroris in sillogismo; aut enim erit in propositionibus
aut in earum congregatione. In propositionibus tripliciter: aut
enim falsa loco vere sumitur, aut particularis loco universalis,
aut in comparatione propositionum erratur. Verbi gratia, si
fuerint in re visa partes que appareant et partes que lateant,
15 que tamen comprehensibiles sunt visui, si in illam figatur visus
intentio, cum videntem partes ille pretereant, ex eis tantum que

119 viridem fortem *transp.* C1L3 120 *post* adhibito *scr. et del.* in *Er/cum inter. a. m.*
S/aliquid: aliquis P3/deinceps: deinde R 121 quidem: enim P3; *om.* C1EErL3R
122 *post et scr. et del.* a L3 123 plurimi: plurum Er 124 aliquando: a natura P1
125 et²: etiam S 126 *et om.* P3/immoderantia (127): immoderatione C1EL3P3R
128 palam: plani R/qui: que EEr/scientie *alter. ex si vere in scientia a. m.* C1 1 pars
... causas (3) *om.* ErP1R/modis; modum C1EL3/erroris: errorum L3 4 plurima:
plura C1/quorum *om.* Er/sit: fit R 5 ex¹: in P1; *corr. ex in S* 6 sit: fit R 7 *post*
occurrat scr. et del. sensu C1/in: etiam P1/formis singulis (8) *transp.* C1EErL3P3R
8 accidit: acciderit EP3R 9 est autem *transp.* ErS 10 in sillogismo *om.* EP3;
inter. L3 12 vere: vero S/*post vere add.* propositionis C1/particularis: particular-
es C1 14 *post* partes *scr. et del.* que C1/appareant *corr. ex apparent* P1 15 tamen:
cum ErL3; *corr. ex cum a. m.* C1/sunt: sint EErP3/figatur: figuram Er; figuratur L3/*post*
figatur *scr. et del.* i S 16 intentio *alter. in intuitio a. m.* C1/*post intentio add.* visus C1L3
(*scr. et del.* C1)/videntem *corr. ex videntes* P1/pretereant: precedant EP3R/que: quare Er

in re visa acquirit concludit. Cum etiam conclusiones aliquas
 quas rei illi accidentes considerat, existimat eas ei accidere ex
 partibus eius apparentibus, quoniam non nisi eas computat.
 20 Cum vero intuitus diligentiam in re illa figit partes prius laten-
 tes, percipit et errorem cognoscit. Enumerabo igitur errores
 eorum que comprehenduntur per sillogismum quorum numerus
 est 22, ut sic pateant errores in sillogismo. Et hec enumeratio
 erit secundum unamquamque octo causarum prius dictarum.

[Distinctio 1]

25 *Et primo secundum longitudinem*

[7.2] Dico igitur quod longitudo egressa a temperamento
 errare facit videntem in longitudine, sicut accidit cum quis
 arbores valde remotas inspexerit, licet plurimum distent inter
 se; videbuntur quasi coniuncte aut saltim existimabuntur sibi
 30 propinque.

[7.3] Ob eandem causam evenit quod stelle aliquae reputan-
 tur quasi coniuncte, licet plurimum distent in veritate. Ob hoc
 stelle erratice existimabuntur ab omnibus in eadem superficie
 cum fixis, licet plurimum elongate sint ab eis. Est igitur error in
 35 longitudine propter egressum longitudinis a temperantia, et est
 error iste in sillogismo cum longitudinis tantum per sillogis-
 mum fiat comprehensio.

[7.4] Longitudo extra temperantiam situs errorem inducit,
 quoniam a tali longitudine corpus declinatum apparebit rec-
 40 tum, et ob hoc corpus quadratum in hac longitudine declina-
 tum videbitur oblongum. Eodem modo oblonga apparebit
 circularis forma si in hac longitudine fuerit declinata, nec

18 rei illi *transp.* P3/eas ei *transp.* C1ErL3/ei: eis C1P1/ei accidere *transp.* EP3 19 eas:
 eam L3/post eas *add.* apparentes C1 20 re illa *transp.* P1/illa: visa C1EL3P3R/figit
alter. in signat a. m. C1 21 ante percipit *add.* prius P1/enumerabo: enumerabit
 C1L3P1P3; enumerabis ErS 22 post que *add.* cum que C1 (cum *inter. a. m.*)/
 comprehenduntur: comprehendit C1EL3P3R/ante per *add.* visus R/quorum numerus:
 qua numero R 23 est: sunt R; *mg. a. m. C1; om. L3/ut corr. ex et a. m. C1/hec . . . erit*
 (24): erit hec enumeratio C1L3/enumeratio erit (24) *transp.* EP3R 24 erit: eorum Er/
 octo: scilicet P1; *inter. a. m. S/post octo add. scilicet S/prius om. C1/dictarum: predic-*
tarum C1 25 et primo *mg. a. m. C1* 26 igitur: ergo R 27 ante in *add.* ipsum
 C1; *add.* eum EP3 28 distent: distant P1S 29 videbuntur . . . veritate (32) *mg.*
a. m. C1/post videbuntur *add.* tamen R 31 quod: ut R/aliquae: aliquando EL3P3R
 32 distent: distant P1 33 existimabuntur: existimantur C1EErL3P3R/omnibus:
 hominibus C1EErL3P3R 34 fixis *mg. a. m. C1; corr. ex* fixus S/sint: sunt C1L3P1/
 igitur: ergo R 38 temperantiam *corr. ex* temperamentum P1 39 a: in P1S/corpus
 declinatum *alter. in* longitudine declinatum a. m. C1 40 in . . . declinatum (41) *om.*
 P1/longitudine *om. C1; inter. L3/declinatum* (41): declinatione C1; *om. P3; corr. ex*
 declinatione L3 42 circularis: quadrati P3 (*mg.*)/si *om. R; inter. L3/post* hac scr. et del.
 in S/fuerit *om. R*

accidet error iste nisi ex declinationis occultatione que latet in tanta longitudine, si enim appareret declinatio, non esset
45 assignate quare occultaretur veritas corporalis forme. Est igitur error in solo situ ex longitudinis immoderatione.

[7.5] Et quare ignoretur situs est hec ratio: Excessus unius radorum in latus quadrati cadentium super longitudinem alterius non est proportionalis respectu totalis remotionis corporis a visu, proportionem dico sensibili; unde propter insensibilitatem excessus non existimabitur maior aliquo aliquis radius.
50

[7.6] Reputatur ergo oblonga quadrati forma, quoniam unum latus eius non declinatum respectu visus cadit in partem oculi, et in minorem incidit forma lateris declinati, quoniam
55 sub minori angulo. Et erit minoritatis perceptio secundum quod fuerit quadrati declinatio, et quoniam non attenditur declinatio, existimabitur unum latus maius alio, quoniam sub maiori angulo, proinde forma apparebit oblonga. Pari ratione
60 in circulari forma, unus dyameter maior apparet alio, unde reputatur oblonga. Et est error iste ex intemperata longitudine, quod non accideret si temperata esset.

[7.7] Si vero longitudo, licet intemperata, non fuerit multum magna, sed valida sit illius corporis declinatio, perpendet
65 fortassis videns declinationem sed non declinationis veritatem; immo minorem existimabit quam sit. Et conferet declinationem lateris angulo sub quo comprehenditur, unde minor apparebit quantitas lateris quam sit, et sic reputabitur quadrati forma oblonga, sed minus quam prius.

70 [7.8] Superfluitas longitudinis errorem generat corporeitatis, corporeitas enim est ex deviatione superficie, et compre-

43 accidit: accidit C1EL3P3R/que: qua P1 44 tanta om. P3/appareret corr. ex apparet a. m. E 45 assignate: assignare C1EL3P3R 47 est hec corr. ex ex hec a. m. C1 48 longitudinem: longitudine ErP3 49 proportionalis: proportionatus L3/corporis (50) om. P3 50 sensibili: sensibilis Er 51 existimabitur: existimatur C1EErL3P3R/aliquo: alio Er/aliquis corr. ex aliqui C1 53 ergo: vero C1EErP3R; alter. in vero L3S (a. m. S)/quoniam: quando C1EL3P3RS 54 latus eius transp. C1EErL3R/post declinatum add. in C1 56 post erit add. huius C1; add. huiusmodi EErL3P3R 57 et ... declinatio (58) om. Er 59 ratione inter. L3 60 unus: una R; corr. ex unius C1L3/unus ... maior corr. ex unum latus maius a. m. S/unus ... apparet: unum latus magis apparebit P1/dyameter corr. ex dyametri C1/alio: alia R 62 quod: quoniam ErP1; corr. ex quoniam a. m. S 63 longitudo corr. ex longum P1 64 sed ... declinationem (65) inter. a. m. S/perpendet: appareret P3 65 fortassis: forte P1; fortasse R/sed non declinationis mg. a. m. C1 67 post lateris add. cum R 68 lateris: talis R/post sit add. unde C1EErL3P3R 71 corporeitas corr. ex corpora C1/enim: autem R/deviatione: declinatione Er; derivatione P1; dispositione R; alter. in derivatione a. m. C1/superficie: speciei EErL3P1P3RS; corr. ex speciei a. m. C1

henditur notitia corporeitatis ex notitia huiusmodi deviationis. Cum ergo accidit error in corporeitate, erit in superficiei vel superficierum dispositione, velut si superficies corporis incurvata ex aliqua longitudine videatur plana, aut plana existimetur curva. Et hec apparentia erit in figura, est enim figura superficierum corporis dispositio. Respicit etiam situm dispositio superficierum, unde corporeitas includitur sub figura et situ, unde errorem corporeitatis gerit in se error figure et situs. Accidit autem error figure absque situs errore ex longitudinis immoderatione.

[7.9] Verbi gratia, figura multorum laterum equalium directe visui opposita in longitudine intemperata circularis apparet non ob aliud quidem nisi quia anguli figure divisi sunt et imperceptibiles visui. Longitudo enim illa abscondit visui etiam proportionalia toti, etsi non totum.

[7.10] Eodem erroris tenore ab hac longitudine, linea curva existimatur recta, non enim perceptibilis est maioritas accessus unius lineae partis incurvate ad visum super partis eiusdem remotioris accessum, quare occultatur incurvatio partium, licet error non accadat in situ lineae illius.

[7.11-12] Similiter visa spera ab hac longitudine, reputabitur superficies plana quoniam propinquitas tumoris eius imperceptibiliter propinquitatem extremitatum ab hac longitudine excedit, unde existimatur equalis partium propinquitas—unde superficiei planitudo, inde est quod sol et luna superficiales videntibus reputantur, que erronea excluderetur figure reputatio si temperata esset longitudo.

72 ex inter. P3/huiusmodi: huius C1/deviationis: derivationis P1; dispositionis R; alter. in derivationis a. m. C1 73 accidit: accidet Er/accidit error transp. C1R/error om. EL3P3/superficiei: speciei EErL3P1P3RS; corr. ex speciei a. m. C1 74 superficierum: specierum EErL3P1P3RS; corr. ex specierum a. m. C1/superficies: species EErL3P1P3RS; corr. ex species a. m. C1 76 erit: erunt EL3P3/enim: igitur EL3P3R; corr. ex igitur a. m. C1 77 superficierum: specierum EErL3P1P3RS; corr. ex specierum a. m. C1/respicit: recipit ER; corr. ex recipit L3/etiam: et C1 (mg. a. m.)/dispositio superficierum (78) transp. R 78 superficierum: rerum P1S; specierum R 79 figure et situs: situs et figure C1EErL3P3R 83 visui inter. L3; mg. a. m. C1/visui opposita transp. EL3P3R 84 quidem om. C1EErL3P3R/divisi: diversi S; om. R/sunt om. EErP3; inter. L3/et om. R/imperceptibiles (85) corr. ex perceptibiles P3 85 longitudo... visui om. P1/post etiam scr. et del. ex L3 86 etsi: quamvis R 87 post eodem scr. et del. modo C1/tenore corr. ex tempore a. m. C1 90 remotioris: remotioris EL3P3/quare: quia C1EL3P3R 91 accadat: accidit EL3P1P3RS; corr. ex accidit C1/lineae illius transp. S 92 post hac scr. et del. spera P3/reputabitur (93): aestimabitur R 93 superficies: species EErL3P1P3RS; corr. ex species a. m. C1/tumoris: timoris P1S; corr. ex timoris E 96 superficiei: speciei EErL3P1P3RS; corr. ex speciei a. m. C1/inde: unde L3; corr. ex unde C1/post est add. et P1S 97 reputantur: reputentur L3; corr. ex reputentur C1/que: itaque P1/excluderetur: excluderetur C1; alter. ex excludentur in excludetur L3 98 esset longitudo transp. P1

[7.13] In magnitudine corporis erit error ex intemperata
 100 longitudine, quoniam videbitur multo minus quam sit in veri-
 tate.

[7.14] Huius rei ratio est quoniam, ut diximus, longitudo
 intemperata est que partes proportionales toti proportionem etiam
 105 sensibili abscondit visui, et cum fuerit occultatio partium sensui
 perceptibilium, anguli in quos cadunt non sentiuntur, licet sint
 totali angulo proportionales.

[7.15] Unde, cum discurrit axis rem visam, absconduntur ei
 lineae multae ex ea et partes multae, unde minor efficitur totalis
 apparentia.

[7.16] Amplius magnitudo partis alicuius corporis non
 110 consideratur nisi secundum magnitudinem anguli in quem ca-
 dit, et magnitudo anguli attenditur secundum partem in visu
 sectam. Et partis sectae quantitas non existimatur nisi secun-
 dum duo puncta illius partis terminalia, et puncta illa sunt
 115 sensibilia et parti sectae proportionalia, quoniam a longitudine
 tanta existimatur res visa secundum fines toti viso proportio-
 nales. Aliter enim non essent fines illi sensibiles. Et fines par-
 tis sectae directe opponuntur finibus partis vise ei proportio-
 nalibus. Puncta ergo illa partis sectae terminalia abscondunt ex
 120 re visa partes sensibiles. Cum ergo incedit axis super singulas
 rei partes ex singulis partibus, absconduntur partes sensibiles,
 et ita minor apparet totalis rei vise quantitas. Cum autem
 videtur corpus a temperata longitudine, puncta terminalia
 partis sectae valde sunt parva et quasi insensibilia ad ipsam
 125 collata. Fines enim rebus visis insensibiles eligit in temperata
 longitudine estimatio videntis, unde non absconduntur toti
 proportionales partes, quare corpus non apparet minus quam
 habeat veritas eius. Amplius, sicut dictum est in superioribus,
 magnitudo non acquiritur in corpore nisi ex longitudinis et

99 erit *corr. ex erat C1; corr. ex esset a. m. E* 102 ante huius *add. et C1EErL3P3R/huius*:
 huiusmodi *C1* 105 sentiuntur: *sentiuntur EP3R; corr. ex sentuntur L3* 106 sint
om. C1EErL3P3R/post angulo inter. sint L3 107 ante unde *add. sint R* 110 alicuius
corr. ex aliquid a. m. C1 111 consideratur: *consideretur P3; corr. ex consideretur a. m.*
E/quem: quam P3 113 non *om. R/nisi om. R* 114 ante duo *add. quod Er/illius*
partis inter. L3/sunt sensibilia (115) transp. EP3R 115 secte: *recte ErP1S/quoniam*
corr. ex quondam C1/a longitudine mg. a. m. C1 117 illi *inter. L3/partis (118):*
parti S 118 ei *om. R/proportionalibus (119): proportionalis C1; corr. ex proportio-*
nalis S 119 ex: *a P1S* 120 incedit *corr. ex incendit L3* 122 totalis: *tota EP3/*
vise om. EErL3P3R; mg. a. m. C1 123 puncta *mg. a. m. C1* 124 sunt *om. P3*
 125 collata: *collocata P1/temperata longitudine (126) transp. R* 126 longitudine
estimatio corr. ex lineae estimatio a. m. C1/toti . . . partes (127): partes . . . proportionales
C1EErL3P3R (toti: totius Er) 127 proportionales: *proportiones S* 129 longitudinis:
 longitudine *EP3*

130 anguli collatione. Et iam dictum est quod in immoderata longitudine apparet minor angulus, quia minor est in veritate, sed remotio non fit discretio.

[7.17] Iam enim superius patuit quod remotio moderata comprehenditur per corpora interposita, immoderata vero
 135 minime. Cum ergo remotio rei vise sit ignota, fiat fortassis collatio ipsius ad longitudinem notam. Et existimabit eam minorem, quare putabitur in angulo minoritas et in longitudine quam sit in veritate, unde error in corporis quantitate. Et quanto augmentabitur longitudo invalescet error, et adeo poterit
 140 augmentari longitudo quod existimabitur quantitas corporis quasi punctalis, et si ultra creverit longitudo, occultabitur visui corpus illud.

[7.19] Simili modo accidit corporis occultatio in temperata longitudine non ex ipsa remotioe sed ex coloris corporis debilitate.
 145 Et patet occultationem fieri in debili colore, quoniam, si loco huius corporis in eadem elongatione statuatur corpus eiusdem quantitatis in quo sit fortitudo coloris, non latebit visum sicut corpus in quo fuerit coloris debilitas, quare aliquando occultat corpus visui non elongatio, non diminuta
 150 quantitas, sed sola coloris debilitas.

[7.20] Amplius evenit aliquando corporis occultatio ex coloris eius similitudine cum interpositorum ipsi et visui corporum colore, et hoc in temperata longitudine. Unde corpus album a longe positum, effusa nive super superficiem interiacentis terre, non discernetur, nive vero remota percipitur. Et
 155 palam quod erit occultatio ex hac colorum ydemptitate, quoniam, si loco corporis illius opponatur visui ab eadem remotioe cor-

130 est om. P3S/in om. EP1P3 133 superius: supra C1EErL3P3R/moderata: immoderata L3 134 interposita mg. a. m. C1 135 fiat: fiet C1EErL3P3R/fortassis: forte P1 136 collatio: collectio ErP1; corr. ex collectio L3S (a. m. S)/longitudinem corr. ex longitudine C1 137 quare: quando P1; corr. ex quando a. m. S/post putabitur scr. et del. est C1; add. et EErL3P3; add. minor et R/angulo: eo P1; corr. ex eo a. m. S/et om. Er/post et scr. et del. e C1 138 post unde mg. est a. m. C1 139 post longitudo add. tanto R/invalescet: invalescit C1EErL3P3/et inter. L3 140 post augmentari scr. et del. ideo? C1/longitudo mg. a. m. C1/quod: quam P3/existimabitur: aestimatur R/post existimabitur add. visui corpus illud C1L3 141 punctalis: punctualis R 143 corporis om. P3; corr. ex corpus P1/ante in mg. ex a. m. C1/temperata longitudine (144) transp. R 144 debilitate (145): debilitatione C1ErL3S 145 in: ex C1EErL3P3/colore: corpore L3 146 huius: huiusmodi C1/eadem mg. a. m. C1/elongatione: longitudine R/statuatur: statur P1 147 sit om. C1 149 corpus om. P1S/elongatio: longitudo P1S 150 ante sed add. corporis C1 151 evenit aliquando transp. C1EL3P3R 152 cum inter. a. m. S/ipsi: ipsum EP3/ipsi et visui corr. ex ipsum visui a. m. C1/et om. EErL3P3 153 post corpus scr. et del. alo P1 154 nive super transp. P1/nive . . . superficiem: super . . . nive S/superficiem: superficies P1 155 ante terre scr. et del. i L3/discernetur: discernitur EP3R 156 erit: erat R 157 corporis illius transp. C1EErL3P3R/visui corr. ex visu S/eadem: eodem L3/post eadem scr. et del. mo P3

pus equale alterius coloris, non occultabitur.

[7.21] Cum igitur aliqua res opposita visui non percipitur,
 160 poterit esse causa absconsionis superfluitas elongationis ad
 partem visus insensibilem formam dirigentis, vel quasi punct-
 talem. Quod si in partem visus sensibilem forma inciderit,
 poterit iterum preterire visum aut propter coloris remissionem
 aut colorum rei vise et corporum interiacentium conformitatem.

165 [7.22] Amplius accidit error in rei vise quantitate etiam in
 temperata longitudine. Quoniam corpore aliquo secundum
 moderationem elongato et viso, occultabuntur visui partes eius
 minute que quidem in minori elongatione apparerent, licet for-
 tassiss non plene, et paululum amplius elongate iterum minus
 170 plene. Et minuetur comprehensionis plenitudo invalescente
 remotionis augumento donec occurrat partium occultatio, licet
 non egrediatur temperantiam illa elongatio.

[7.23] Iterum immoderata remotione pars aliqua plene
 comprehenditur, et aliqua minimarum eius partium occultatur,
 175 quoniam elongatio rei egressa est a temperamento proportio-
 nato ad partes illas, licet non respectu totalis corporis aut
 comprehense partis. Et licet nota sit homini hec longitudo,
 tamen accidit error in comprehensione quantitatis partium, et
 hoc propter angulum sub quo pars comprehenditur cuius ca-
 180 pacitas minor existimatur quam habeat veritas. Et causa
 apparentie minoritatis eius est ex punctis terminalibus secte in
 visu partis partium occultantibus, et anguli capacitatem con-
 stringentibus. Igitur, cum immoderata fuerit rei vise ab aliquo
 distantia, perveniet error in eius quantitate dupliciter: et ex
 185 anguli minoritate et ex longitudinis incertitudine. Immoderata
 vero longitudine erit error in quantitate minutarum partium ex

160 causa: clausa P1/superfluitas: superfluitatis P3 161 ante formam add. partem
 P3/dirigentis: diligentis S/punctalem (162): punctalem R 162 forma inciderit:
 formam acciderit P1 163 aut: vel R/coloris: color S 164 aut: vel R/interia-
 centium corr. ex interiatium P3 165 post vise scr. et del. et corporum S/etiam:
 et C1L3P1S 166 temperata longitudine transp. R/secundum corr. ex etiam C1
 167 moderationem: moderantiam Er/elongato: elongatio Er/ante visui add. per visus
 a. m. C1; scr. et del. per L3/partes: parte P1 168 in om. P3/minori: minore R/fortassis
 (169): forte P1 170 post minuetur add. et P3 172 post elongatio scr. et del. rei
 egressa est a temperamento proportionato ad partes illas S 173 plene: plena P3
 174 et om. EEerL3P3R; mg. a. m. C1/minimarum: minutarum P1/eius om. P1 175 rei
 ... est: est rei egressa S/proportionato (176): proportionata C1EEerL3P3 176 totalis:
 totius R 178 post error scr. et del. in corpore C1 179 post hoc add. est C1
 180 habeat: sit P1 181 eius: cuius P3/est om. P1/in visu (182) om. C1EEerP3; inter.
 L3S (a. m. S)/in ... partium (182): partis in visu partem R 182 constringentibus
 (183): constingentibus EP3 183 ante igitur scr. et del. sibi P3 184 perveniet:
 provenit C1; proveniet EL3P3; corr. ex pervenit S/ex om. EEerL3P3; mg. a. m. C1
 185 post et add. sic C1L3 (scr. et del. C1) 186 partium om. EP3; inter. ErL3 (a. m. Er)

errore anguli tantum. Et hee sunt cause quare corpus existimatur minus quam sit in temperata longitudine.

[7.24] Immoderatio longitudinis aliquando errorem inducit
 190 maioritatis, unde in longitudine non temperata (minima scilicet), quando corpus visum fuerit multum prope oculum, videbitur corpus maioris quantitatis quam in longitudine temperata vel quam sit re vera.

[7.25] Et hoc duplici de causa, quoniam, ut dictum est,
 195 intellectus longitudinem et angulum considerat et inde quantitatem corporis sillogizat, et in hac elongatione angulus pyramidalis est valde magnus. Et elongatio corporis non existimatur nisi a visus superficie ad superficiem corporis, non enim potest cadere in visus estimationem longitudo ad interiora
 200 visus penetrans a corpore viso cum pars eius interior radiis non subiaceat nec mensurari a visu queat. Sillogizat ergo visus ex anguli capacitate et nota longitudine. Vera autem remotio corporis attenditur secundum lineam a centro oculi ad corpus procedentem, cum respectu centri fiat consideratio
 205 anguli. Et in temperata corporis distantia semidiameter oculi qua vera corporis elongatio excedit apparentem, insensibilis est respectu totalis distantie corporis, unde non facit errorem in longitudinis estimatione. Sed corpore circa oculum existente, erit magnitudo semidiametri proportionalis distantie
 210 corporis proportionem sensibili. Erit igitur aliquando maior, aliquando equalis, aliquando minor, sed proportionem modica, velut subdupla vel huiusmodi; unde in propinquitate rei vise excrementum anguli pyramidalis et sensibilis minoritas longi-

187 anguli *mg. a. m. C1/post anguli scr. et del. et hoc sunt P1/tantum om. P1S/et om. P1/cause corr. ex eadem a. m. C1/existimatur (188): aestimetur R* 188 temperata: multa *P1S/temperata longitudine transp. C1L3R* 189 aliquando: a natura *P1/inducit: ducit P1S* 190 non temperata: immoderata *C1EErL3P3R/minima: minuta C1* 191 post multum *add. vel P1S/prope oculum: vicinum visui R/post prope add. circa P1S/oculum om. EErL3P3; mg. a. m. C1* 192 in *om. Er/longitudine om. EL3P3; inter. Er/longitudine temperata transp. C1* 193 post sit *add. in C1L3* 195 considerat *corr. ex siderat L3* 196 pyramidalis (197): pyramidis *R* 197 est *om. EErL3P3; mg. a. m. C1/non om. P1* 198 superficiem: speciem *EErL3P1P3S; corr. ex speciem a. m. C1* 200 post visus *scr. et del. estimationem longitudo ad interiora visus C1/interior corr. ex interiora P1* 201 queat *inter. L3/ante ergo add. autem S/ergo: igitur EP3R* 202 nota: mota *L3; tota R/vera: natura P1S* 205 semidiameter: semidiametri *P1S/oculi om. P3* 206 qua: quia *P1; corr. ex que L3/excedit: excedet L3; corr. ex excederet C1; corr. ex procedit P1* 207 totalis *corr. ex talis E* 209 proportionalis: propinquior *C1EErL3P3; alter. in propinquior a. m. S* 210 igitur: enim *C1EErL3R; erit P3/* aliquando: a natura *P1/major aliquando (211) om. P1* 211 aliquando¹: a natura *S/* aliquando²: a natura *P1/sed om. C1; inter. L3/post proportionem scr. et del. n P1* 212 propinquitatem *corr. ex propinquitatem P3* 213 minoritas longitudinis (214) *corr. ex in minorialis vel a. m. C1/longitudinis (214) inter. L3*

215 tudinis estimate respectu vere inducunt apparentiam maiori-
tatis in corpore.

[7.26] Immoderata extensio remotionis errorem invehit
distinctionis. Pariete igitur aliquo a longe intuito, si in parte
eius fuerit color tenebrosus, fiet videnti fides colorem illum
esse distinctionem partium, unde continuum ex hoc errore
220 reputatur discretum. Similiter, si prope parietem illum crescat
altitudo herbarum, videbitur distinctio partium inter quas
fuerit pars occulta ab oppositione herbarum, unde non reputa-
bitur paries aliquid continuum.

[7.27] Pari modo, luce solis in parietem descendente non
225 multum forti, si corpus umbram iaciat que umbra in parietem
cadat, accidit error idem in partium sine intermedio separa-
tione.

[7.28] Palam ergo quod error distinctionis est in sillogismo
ex immoderantia remotionis.

230 [7.29] Longitudo a moderatione egressa erroris continuita-
tis est causa. Corpora enim a longe visa in colore similia sibi
propinqua creduntur continua. Hinc accidit quod tabule pari-
etis vel scanni apparent aliquando continue, licet adinvicem
sint divise modica, dico, distinctione. Et accidit hoc in tem-
235 perata remotione vise, sed immoderata quantum ad compre-
hensionem distinctionis tam parve.

[7.30] Et ita ex hoc remotionis errore discretum creditur
continuum.

240 [7.31] Et quoniam secundum considerationem continuitatis
et discretionis attenditur numeri comprehensio, accidit error in
numero cum in rebus discretis apparebit unitas aut in re una

214 ante estimate add. vel L3/respectu om. P3 217 post pariete add. enim Er/longe:
longo C1L3/intuito: intuitio Er; viso R 219 unde: et P1S/ex: et P1 220 repu-
tatur: reputabitur C1EErL3P3R 221 herbarum corr. ex fabarum C1L3 (a. m. C1)/post
herbarum scr. et del. crescat altitudo herbarum S/post videbitur add. forsan C1EErL3P3R
222 occulta alter. in occultata C1/post ab add. omni P1R/unde: inde EP3; videre L3; corr.
ex videre a. m. C1 223 aliquid: aliquis Er 225 post corpus add. aliquid
C1EErL3P3R/ante umbram scr. et del. i C1/iaciat: iaceat C1; lateat P1S 226 accidit:
accidet R 228 quod om. EErL3P3; mg. a. m. C1/ante error mg. est a. m. C1/est om.
C1EErL3P3/est . . . sillogismo: in . . . est R 229 immoderantia: immoderatione R/
post immoderantia scr. et del. i P3 230 moderatione: remotione P3 231 in om. C1;
inter. L3/similia: similuna P1; similima S 233 apparent aliquando transp. C1L3/
continue: continui P1/adinvicem: abinvicem R 234 sint: sunt P1S/dico inter. a. m.
S/accidit: accidet P1R/accidit hoc transp. C1L3/post hoc add. etiam EP3R; add. et Er/in
om. ErL3/temperata (235): imtemperata R 235 post remotione add. rei C1R (mg. a. m.
C1)/sed: scilicet R/quantum: quam P3 236 ante distinctionis add. remotionis EP3R
237 et mg. a. m. C1 240 et inter. a. m. S 241 numero corr. ex modo a. m. C1/in¹
om. L3; inter. a. m. C1/discretis: distinctis P1S/una: visa P1

pretendetur pluralitas.

[7.32] Egressus remotionis a moderamine errorem efficit
 motus. Si quis ad partem in qua lunam, aut solem, aut stellam
 245 aliquam viderit moveatur cum plurimum motus, lunam ante se
 videat elongatam non minus quam in principio motus. Con-
 cludit ipsam in partem eandem moveri, et ab eo recedere, et ob
 hoc elongationes durare. Et accidit hoc luna etiam ad partem
 eius properante. Et huius erroris ratio est quia notum est vi-
 250 denti quod in hiis inferioribus, statutis duobus corporibus quo-
 rum unum moveatur in partem aliquam, si permanserit ydemp-
 titas situs uni respectu alterius, necesse est aliud moveri in par-
 tem oppositam et motu equali.

[7.33] Cum ergo in hiis non percipiatur situs motus moven-
 255 tis ad stellam motam, occulte ex propositionibus iam dudum
 animo notis, infertur sillogistice motio. Et occultatur situs eius
 moventi ad stellam immutatio, quoniam via quam peragit
 motu suo non est proportionalis ipsius stelle magnitudini, mul-
 to magis excessus postreme propinquitatis eius ad stellam
 260 super primam propinquitatem non est sensibilis respectu to-
 talis remotionis. Idem error accidit in motu nubium, creditur
 enim velocissimus esse lune motus, licet non sit, et nos supra
 explanavimus.

[7.34] Evagatio remotionis a temperamento errorem infert
 265 quietis. Si quis a longe visus motu moveatur non veloci, quies-
 cere putabitur, unde stellas erraticas credimus immotas, licet
 insit eis motus velocitas.

[7.35] Et hec est quietis stellarum estimatio, quoniam vie
 quas incedunt etiam in tempore magno non sunt perceptibiles

242 pluralitas: pluritas EP1P3 246 videat: viderit R 247 partem eandem *transp.*
 EP3R/eandem: oppositam P1S 248 elongationes: elongationis EP3/etiam: et P1S
 249 eius: contrarium R/et . . . erroris *corr. ex* erroris et huius S/huius erroris *transp.* C1/
 ratio *corr. ex* non a. m. C1/est² om. EP3; inter. C1L3 250 post inferioribus *add.* natu-
 turis R 252 uni: unius P3R/post uni *scr. et del. reel* C1/aliud: alium Er; *corr. ex* ali-
 quando L3; *alter. ex* aliquando in alium a. m. C1/partem oppositam (253): eandem par-
 tem R 253 post equali *add.* verum hoc non oportet existimare in luna et stellis R
 254 ergo: enim R/motus om. C1ErL3P1S/moventis (255) om. P1S 255 stellam: illam
 P1S/ex: et Er 256 sillogistice *alter. ex* simile in stelle a. m. C1/post occultatur *add.*
 immutatio R 257 moventi: momenti P1/immutatio om. R; *alter. ex* et mutatio in
 immutatione a. m. C1/quoniam: quam EP1/via *corr. ex* una S/post quam *add.* quis R
 259 magis: maius P1S/post magis *add.* igitur R 261 accidit om. P1S 262 post et
add. etiam P1S; *add.* ut R 264 evagatio: et vagatio L3; evacuatio P1S; *corr. ex* et
 vagatio C1/ante a *scr. et del.* idem errore S 265 moveatur non veloci: non . . .
 moveatur C1EErL3P3R/non *corr. ex* vero a. m. C1/quiescere putabitur (266) *transp.*
 C1EL3P3R 266 erraticas: errantes C1EL3P3R 267 insit eis: in superficie eius sit
 Er; *corr. ex* in superficie eius sit a. m. L3/velocitas: velocitatis P3 268 et: etiam EP3/
 hec: hoc P1/hec est *transp.* R 269 non sunt: est EErL3P1P3S; *corr. ex* est a. m. C1/
 perceptibiles: perceptibilis EErP1P3S; *alter. in* perceptibilis L3

270 visui a tanta remotione, unde durante situs earum respectu
videntis ydemptitate, existimantur quiescere.

[7.36] Pari modo si corpus aliquod a longitudine magna
moveatur super radios visus, et est accedendo ad visum vel
recedendo ab eo, putabitur immotum nisi motus eius fuerit
275 valde fortis. Et accidit error iste quoniam, ut supra patuit,
motus non comprehenditur in corpore nisi quia modo videtur
cum aliquo corpore, modo cum alio. Hic autem excluditur hec
perceptio, quoniam via quam incedit movens super radios
imperceptibilis est a tanta longitudine.

280 [7.39] Superflua longitudo errorem ingerit asperitatis.
Unde in capillis alicuius picte ymaginis a longitudine intem-
perata existimatur asperitas enim cum expressa fuerit pictura.
Quia notum est asperitatem esse in veris capillis, concludit
eam animus similiter illis inesse propter expressionem forme.
285 Idem error accidit in vestibus depictis et animalium pilis
expresse depictorum.

[7.42] In hiis autem omnibus non est asperitas sed immensa
lenitas; et licet a corporibus lenitis fiat reflexio lucis non ab
asperis, tamen in pictura aliquando videtur reflexio lucis, nec
290 ob hoc excluditur opinio asperitatis. Quoniam opinanti est
certum aliquando in eodem corpore asperitatis et reflexionis
fieri concursum, sicut accidit in capillis hominis nigerimis et
bene lotis, reflectitur enim lux in eis licet asperis.

[7.43] Unde ex hac similitudine accidit error in estimatione
295 asperitatis picture per immoderatam remotiorem ad corpus
pictum proportionatam. Non enim poterit comprehendere leni-
tas in pictura nisi cum multum fuerit certa; unde distantia res-
pectu aliarum rerum temperata extra temperantiam est ad

270 situs: situ R; acus S 271 videntis *corr. ex videns a. m. Er/existimantur: existimabi-*
tur EP3 272 magna *om. EL3P3R; mg. a. m. C1* 273 et: etiam *Er/est accedendo:*
accedat R/post ad add. ipsum EP3R/vel om. P1 274 recedendo: recedat R
275 accidit: accidet *S/error iste transp. R* 276 quia: quoniam *P1* 277 corpore
corr. ex tempore L3/modo: moto P1/post modo scr. et del. n Er 278 perceptio:
preceptio P1S/post perceptio add. motus C1 279 post tanta *scr. et del. picte ymagi-*
nes S 280 ingerit: invehit *L3; corr. ex invenit a. m. C1* 281 picte: picture *Er/*
intemperata (282): temperata EP3 282 enim *om. C1EErL3P3R/post enim scr. et del.*
expressa P1 283 post quia *add. enim R/esse om. L3/capillis om. P1; inter. ErL3S*
(a. m. ErS) 284 similiter illis *transp. R* 285 pilis *alter. in pennis a. m. C1*
287 sed *corr. ex et a. m. C1* 288 lenitas *corr. ex lentas S/lenitis: laevibus R; alter. in*
lenibus a. m. C1 289 tamen: cum *L3/lucis corr. ex licet a. m. Er* 290 ob: ab *EP3/*
quoniam . . . asperitatis (291) om. P1/opinanti: opinati P3 291 certum: centrum *S/*
corpore: tempore Er/ante asperitatis inter. corporis a. m. Er 292 concursum: cursum
P1S/hominis om. P1 294 ex: in *C1* 296 post pictum *add. et C1L3 (scr. et del. C1)/*
proportionatam: proportionatum EErL3P3R; corr. ex proportionatum a. m. C1/lenitas
(297) corr. ex lenita a. m. C1; corr. ex lenitates S 298 temperata *om. R*

adquisitionem lenitatis comparata.

300 [7.44] Ex evagata remotione accidit error in lenitate. Si enim
a magna longitudine opponatur visui corpus in quo est modica
asperitas, putabitur lene, asperitas enim non acquiritur in cor-
pore nisi ex diversitate situs partium inter se vel luce
eminentium et umbra depressarum, sicut explanatum est su-
perius. Et a tali longitudine non attenditur diversitas situs
5 partium aut proectio umbre eminentium super depressas,
unde iudicatur in eo lenitas.

[7.46] Ex immoderatione elongationis oritur error raritatis.
Cum circa oculum erigitur acus aut aliquid subtile multum, licet
10 appareat visui maius quam sit, ei tamen nihil occultat de op-
posito pariete aut alio opposito corpore. Unde, cum fiat rari-
tatis comprehensio in corpore ex eo quod post ipsum possum-
us aliquid videre, in acu erecta aut in aliquo consimili raritas
existimabitur, cum post ipsam totus paries videatur. Quare
15 autem acus prope visum sita maior appareat patet ex superi-
oribus. Quare autem in tanta propinquitate nihil abscondat
visui ex opposito pariete est quia remotio tam modica respec-
tu occultationis acus est immoderata. Si enim paululum elon-
getur ab oculo acus illa, occultabitur pars parietis maior acu
20 ipsa.

[7.47] Et huius rei causa plenius deinceps explanabitur.

[7.48] Ex superhabundantia longitudinis accidit error soli-
ditatis. Si quis a longe intueatur corpus rarum, et statuatur
post ipsum corpus coloratum aut quid tenebrosum, non repu-
25 tabitur corpus illud rarum sed solidum. Et est error quoniam
post corpus illud non percipit aliud. Cum natura rari sit ut post
ipsum possit videri solidum, concludetur corpus illud non
esse rarum sed solidum.

[7.50] Ex superfluitate remotionis oritur error in umbra. Si
30 a tali longitudine opponatur visui corpus album in quo sit pars

300 evagata: vagata L3; corr. ex vagata a. m. C1 1 est om. EEEL3P3; mg. a. m. C1/est
modica transp. R 2 corpore (3) corr. ex corde a. m. C1 5 attenditur: percipi-
tur R 6 aut... umbre om. R/post depressas add. aut proectio umbre R 7 iudi-
catur: indicatur Er 8 ante ex add. et Er 9 post cum add. enim R/circa alter. in contra
a. m. C1/erigitur: eritur E; erit P3 10 ei om. C1EEEL3P3R/post occultat add. ei C1EEEL3P3R
11 pariete... opposito om. P1/alio om. S/raritatis (12): unitatis EP3; corr. ex unitatis C1L3
(a. m. C1); corr. ex raritas S 13 aliquid om. C1EP3; inter. L3/aliquid videre transp. L3/
aut om. C1EL3P3 15 sita: situm P3; corr. ex situm a. m. E/appareat: apparet C1
17 opposito pariete transp. R 18 est immoderata transp. C1EL3P3R 21 huius:
huiusmodi C1/deinceps: deinceps P1; om. C1EL3P3R/post explanabitur add. in septimo
libro C1 23 post quis add. enim R 24 corpus om. S/quid: aliquid C1 26 aliud:
illud Er/rari: raritatis P1S 27 corpus illud transp. P1 29 post si add. enim R
30 post tali add. in Er/opponatur corr. ex operatur P1

tenebrosa, luce solis super corpus illud descendente, apparebit umbra in parte corporis tenebrosa.

[7.51] Et hoc pro constanti habito, si circa corpus illud videatur aliud, fiet conclusio quod umbra apparens proiciatur ab illo alio. Et palam quod accidit error iste ex nimia remoti-

one.
[7.52] Propter distantie excessum se ingerit error tenebrarum. Si a longe videatur corpus album in quo pars nigra multum sit, existimabuntur fortassis in parte illa tenebre, unde fiet conclusio quod in directo illius partis sit foramen corporis per quod appareat tenebrarum egressio post corpus illud existentium.

[7.54] Remotio excedens modum causa est erroris speciei et deformitatis. Cum a longe inspicitur res aliqua, si fuerint in ea macule parve ipsam deformantes, quia occultantur ex longitudine, iudicatur formosa. Quoniam ex solis apparentibus fit conclusio, et quia latent macule, apparent vero partes formose.

[7.56] Similiter, si a tanta longitudine videatur res in qua sunt picture, sed minute rei totali, decorem conferentes, cum lateant visum cause decoris, iudicabitur res illa deformis, cum ex apparentibus tantum iudex sumat iudicium.

[7.58] Ex superflua elongatione accidit error in similitudine corporum et dissimilitudine. Si dirigantur visus in corpora longe remota in colore similia, si fuerint in eis note vel protractiones minute sibi dissimiles et diverse, cum visus pretereant, iudicabuntur corpora ex toto similia.

[7.60] Econtrario, si diversitas fuerit in totalibus corporum coloribus, sed in eis sunt note minute inter quas adinvicem sit similitudo, iudicabuntur dissimilia ex toto. Et accidet error

33 hoc . . . habito *om.* R/circa: cura L3; *alter. in* contra C1
proiciatur: percipiatur C1EP3; *corr. ex* percipiatur L3
38 *post si add.* enim R/a: autem EP3/a longe: procul R
existimabuntur: existimabitur P3; *corr. ex* estimabitur a. m. E/fortassis: forte P1/*post* fiet
scr. et del. oculo C1
40 conclusio *corr. ex* oculo L3/quod: quia C1EL3P3/directo:
directe P1S
41 *post:* preter C1Er; *corr. ex* preter L3
43 speciei: pulchritudinis R
44 deformitatis: formitatis P1/a longe: enim procul R/inspicitur: respicitur EP3
45 ipsam: eam R
46 iudicatur: indicatur Er; videtur P1/*post* solis
add. rebus C1
47 *ante et add.* quod est P1S/*et om.* P1S; *scr. et del.* C1/quia *om.* EEerL3P3R; *mg. a. m.* C1/*post* macule *add.* et P1S/*vero om.* P1S
49 si *om.* P3/a:
cum P1
50 cum: non L3
51 cause: causa P3; *inter.* L3
52 iudex sumat
transp. C1EEerL3P3R
54 *post si add.* enim R
55 *ante si add.* et R/si *inter.* a. m. C1/
protractiones (56): pertractiones Er; *corr. ex* pertractiones C1L3 (a. m. C1)
56 minute: minue Er/sibi: sed si Er; scilicet L3/*post* diverse *add.* quae R
59 sunt: fuerint C1; sint EEerL3P3/adinvicem *om.* R
60 accidet: accidit C1Er/error quoniam (61)
rep. P3

quoniam ex solis apparentibus fiet conclusio.

[Distinctio 2]

*Situs egreditur a temperamento et error-
em inducit in quolibet eorum quorum
fit comprehensio per sillogismum.*

[7.63] In longitudine, si videantur duo corpora quorum
5 unum sit post aliud directe, ita quod unum cooperiat partem
alterius, et pars posterioris emineat, et hoc in longitudine tem-
perata, non tamen multum certa, nec inter ea fuerint alia cor-
pora, non plene existimabitur longitudinis unius ad aliud men-
sura, et forsitan iudicabit videns ea sibi esse valde propinqua.

10 [7.64] Et est error iste in sillogismo, cum per sillogismum
tantum comprehendatur longitudo per situm, quoniam, si non
occultaret unum alterius partem, sed utrumque totum expon-
eretur visui, ut via inter ipsa in diversos non in eundem inci-
deret radios, discerneretur distantia unius ab alio. Et est error
15 ex sola situs intemperantia, quoniam situ ad temperantiam
reducto, ceteris partibus non mutatis, non accidit error.

[7.65] Situs extra temperantiam situs visui errorem invehit.
Cadente axe visuali in corpus a temperata longitudine opposi-
tum visui, sumpto alio corpore multum elongato ab axe declin-
20 ato modicum super lineam intellectualem super quam cadit
axis perpendiculariter, non comprehendit videns corporis illius
declinationem propter situm a temperamento egressum. Quo-
niam non plena fit comprehensio corporum longe ab axe posi-
torum, et in hoc errore declinatum iudicabitur rectum.

25 [7.67] In figura accidit error per situm. Si corpus circolare,
ut ciphus vel scutella, ab axe elongetur et modicum super line-

61 solis: solum EP3R 1 et inter. C1 4 in longitudine: inde P1; corr. ex inde a. m.
S/ante si add. ut R 5 sit om. EEerL3P3; mg. a. m. C1/aliud: alium EL3P3S/quod: ut
C1L3RS 7 inter: intra L3; corr. ex intra C1/fuerint: fiunt L3 8 aliud: alium
C1EEerL3P3; illud S 9 forsitan: forte P1/sibi . . . valde: valde . . . esse C1EL3P3R
10 iste om. R/ante cum scr. et del. cum C1 11 post situm add. vero C1EEerL3P3R/non
. . . unum (12): unum non occultaret C1EEerL3P3R 12 post utrumque add. istorum P1/
totum: toti P1; om. C1; inter. L3 13 ipsa corr. ex ipsam L3/incideret (14): incider-
ent EP3 14 discerneretur: discernetur C1L3 16 reducto: redacto Er; deducto P1/
non¹: que P1/accidit: accidit Er/post error add. aliis C1EEerL3P3; add. talis R 17 visui:
in situ EEerL3P3R/invehit corr. ex invenit a. m. C1 18 post cadente add. enim R/visuali
corr. ex visui Er/temperata: temperamenta S 19 elongato: elongatio Er/post axe add.
et R 20 cadit: cadet C1EL3P3 21 comprehendit: comprehendet C1EEerL3P3
23 longe ab axe: ab axe longe R 24 declinatum: declinans P1S/iudicabitur: iudicabit
EP3R/ante rectum add. visus R 25 accidit: autem EP3R/post error add. est R/per
situm corr. ex partium a. m. C1/post si add. enim R 26 ciphus: cophus EEerP3

am intellectualem quam diximus declinetur, quoniam occultatur eius declinatio, et unus eius dyameter sub maiori angulo comprehenditur quam alius, qui enim apparet rectus maiorem
 30 respicit angulum quam declinatus, et quia notabilis est excessus unius anguli ad alium, iudicatur dyameter rectus maior declinato, unde circularis figura corporis iudicabitur oblonga.

[7.68] Pari errore figura quadrangula existimabitur oblonga, cum latus eius directe oppositum oculo maius appareat
 35 latere declinato.

[7.70] Et est error in sillogismo, premitit enim propositiones in quibus falsitas est—scilicet neutrum laterum esse declinatum; et visa ab eadem longitudine sub eodem situ et inequalibus angulis sunt inequalia; et oblonga est forma cuius unum
 40 latus inaequale alii—inde concluditur error non veritas figure. Ex eadem causa palam esse errorem in quantitate cum dyameter circularis corporis maior videtur alio eiusdem dyametro cui est equalis.

[7.71] Amplius alio modo accidit error in magnitudine ex
 45 situ intemperato et solo cum aliquis in altum positus intuetur sub altitudine illa incedentes et inter se equales eis in ordine uno post alium dispositis, radius cadens super primum absque dubio demissior erit radio cadente super secundum. Et secundum quod augmentabitur elongatio alicuius eorum a primo,
 50 maior erit radii super ipsum cadentis altitudo, unde altior erit radius cadens in postremum quam in aliquem alium. Iudicabitur ergo a vidente postremus maior omnibus ita, dico, si terre spatium inter quoslibet duos situm lateat visum ne in collatione ad terram apparentem facta comprehendi possit altitudinis

27 quoniam *om.* R/occultatur (28): occultabitur R 28 unus: unius C1; una R/
 dyameter: dyametri S/maiori: maiore R 29 comprehenditur: comprehendetur R/
 alius: aliis Er; angulus P1S; alia R/qui: quae R/rectus: recta R 30 respicit: recipit
 C1EP3; recipit L3/declinatus: declinata R/excessus . . . alium (31): unius anguli ad
 alium excessus C1EErL3P3R 31 rectus: recta R 32 declinato: declinata R
 33 oblonga (34) *corr.* ex longa L3 36 error *mg.* P3/premittit: premitit EL3P3S; *corr.*
ex premittit a. m. C1Er/propositiones (37): proportiones S 37 falsitas est *transp.*
 P1R/est *om.* EErP3; *inter.* L3; *mg.* a. m. C1/esse *om.* C1EErL3P3 38 et²: etiam P1
 39 sunt: esse R/est: esse R 41 esse errorem *transp.* R 42 alio: alia R 44 alio
 modo *om.* P1S 45 intemperato: intemperamento P1P3/altum: alto R; *corr.* ex
 alterum a. m. C1/intuetur: videtur L3; *corr.* ex videtur a. m. C1 46 altitudine:
 latitudine Er/ante illa *add.* vel latitudine P1S/et: etiam EErP3 47 dispositis: depositus
 L3; *alter.* ex deponitur in disposito a. m. C1 48 dubio *corr.* ex duo L3/secundum¹ *corr.*
ex secunda C1/et *om.* P1S/secundum (49) *om.* C1 49 ante quod *add.* quanto enim
 C1P1S (*mg.* a. m. C1)/quod *scr.* et *del.* C1/augmentabitur: augmentatur EP3/primo: primis
 C1; prima L3/post primo *add.* secundum illud R 50 cadentis: cadentes C1/erit²: aut
 S/post erit² *scr.* et *del.* c Er 53 situm: situum L3; situs P1/ne *corr.* ex neque P1/
 collatione ad terram (54) *corr.* ex collectione de terra a. m. C1

55 homini mensura.

[7.72] Et erit error in sillogismo, quoniam errat in antecedentibus quorum unum est quaecumque apparent altiora sunt maiora, et hoc non invenitur in omnibus sed in pluribus.

[7.73] Et est error ex situs immoderatione respectu comprehensionis magnitudinis rei sic disposite, si enim radius cadens in primum sit equidistans terre, et idem radius cadat in quemlibet alium processu suo, non habebit locum error iste.

[7.75] In distinctione provenit error ex excessu situs. Si magna fuerit corporis alicuius super radios declinatio, et fuerint in eo puncta sensibilia nigra vel valde tenebrosa, putabuntur forsitan esse foramina, et ita inter partes huic tenebrositati affines iudicabitur divisio, licet ibi sit continuitatis unio. Si vero in hoc corpore fuerint lineae sensibiles tenebrosae, iudicabuntur conterminales divise cum sint continue, et ita error
70 accidit ex corporis declinatione.

[7.77] In continuitate erit error ex situ. Si apponatur visui plurium parietum dispositio quorum unus sit ordinatim post alium modicum distans ab eo, et omnes cadant super eundem radium, occultabitur forsitan videnti spatium quod inter eos
75 fuerit.

[7.78] Unde putabuntur continui cum sint divisi, quod non accidet situ parietum immutato ut non comprehendantur sub eodem radio.

[7.79] Error inducitur in numero ex situ immoderato quando corpus aliquod videtur duo, et hoc accidit cum respectu duorum visuum corpori diversitas situs fuerit. Pari modo et in corpore uno iudicabitur pluralitas cum inter duos axes corpus visum ceciderit, sicut supra patuit.

55 homini: hominum C1EErL3RS 56 et om. R/errat: error P1/in²: inde Er 58 invenitur: inveniuntur P1/post pluribus add. tamen C1 59 immoderatione: immoderamine C1ErL3 60 sic disposite transp. C1EL3P3/post radius add. visualis C1EErL3P3 61 terre: cum re L3/cadat om. EP3 62 iste: enim Er 63 ante in add. et C1EP3/provenit: erit C1EL3P3/error om. P1/ex om. ErL3/situs: eius P1S/post si add. enim P64 fuerit corr. ex fuerint P3 65 ante in scr. et del. e Er/post puncta scr. et del. decli P3 66 forsitan: forte P1/huic: hec P1S (inter. P1); om. L3; mg. a. m. C1/huic tenebrositati corr. ex tenebrositati huic Er/tenebrositati: tenebrositas ErP1S; tenebrositati R 67 affines om. P1S/ibi corr. ex sibi P1/unio corr. ex uno ErS (a. m. S) 68 sensibiles: subtiles P1; corr. ex subtiles a. m. S/iudicabuntur coterminales (69) transp. C1L3 69 sint: sit L3P1S/ita om. EP3; corr. ex prima a. m. S 70 accidit: erit C1Er (inter. a. m. Er); om. EL3P3/post ex add. nimia C1ErL3; add. minima EP3 71 ex situ mg. a. m. E/apponatur: opponatur C1/visui inter. a. m. E 72 plurium: plurimum L3/sit om. C1EErL3P3/ordinatim: ordinatum C1L 74 forsitan: forte P1 76 unde: inde L3; corr. ex inde a. m. C1 77 immutato: terminato EP3; corr. ex terminato L3; alter. ex terminato in mutato a. m. C1/comprehendatur: comprehendatur EErL3P3 81 corpori diversitas: corporis diversus R/situs fuerit transp. EP3R 82 iudicabitur: iudicatur C1EL3P3R/pluralitas: pluritas EP1P3/corpus visum (83) om. P1S

[7.80] Et est error in sillogismo, premittit enim videns esse
 85 diversa corpora exterius visa. Cum forma interius in diversa
 visus ceciderit loca, inde diversitatem ubi ydemptitas est con-
 cludit.

[7.81] In motu oritur error ex situ, ut navem currentem in
 flumine aliquo inspiciente, si fuerint in littore fluminis arbores
 90 ab axe multum elongate, putabuntur moveri.

[7.82] Et si fiat directio axium super eas, videbuntur im-
 mote.

[7.83] In quiete error ex situ se ingerit. Intuita re aliqua, et
 tota que citissimo motu volvatur ab axe elongata, apparebit
 95 immota.

[7.84] Et planum est per situm esse errorem, quoniam, situ
 mutato, percipietur eius motio, unde error ex situ solo intem-
 perato.

[7.85] In asperitate situs errorem facit. Si a capillis ex-
 100 presse depictis fiat reflexio lucis, et non fuerit visus in loco
 reflexionis, fiet in eis comprehensio asperitatis cum sola sit in
 eis lenitas.

[7.86] Et est error ex situ solo, quoniam visu sub luce
 reflexa sito non comprehenditur asperitas in corpore viso.

[7.87] In lenitate erit error ex situ. Cum aliquid elongatum
 fuerit ab axe, si modica fuerit in eo asperitas, apparebit lene
 cuius quidem asperitatem.

[7.88] Situ ad temperantiam reducto, posset videns com-
 prehendere.

[7.89] In raritate et soliditate fiet error ex situs immodera-
 mine. Si descenderit lux declinata in vitrum vino plenum, et
 lateat visum transitus lucis per vitrum, et magna sit declinatio
 illius a radiis, et videntem lateat vinum esse in vase vitreo,

84 *post enim add. error P3/post esse scr. et del. di C1* 85 in: et Er 86 inde diver-
 sitatem: in diversitate ErP1S/ubi: nisi P3/post ubi *add. est Er/ydemptitas: dentitas Er*
 88 ut: alio EL3P3; aliquo Er; *corr. ex alio a. m. C1* 89 fuerint: fuerit L3 91 et
om. C1L3 93 error ex situ: ex situ error C1L3/intuita: visa R/aliqua: alia C1EL3P3/
 et: ut R 94 tota: rota ER/citissimo: certissimo S/citissimo motu *transp. C1EErL3P3R*
 96 et... errorem *om. P1S/est om. ErL3; inter. a. m. E* 97 percipietur: percipitur C1L3/
 motio *corr. ex mutatio L3/post unde inter. est a. m. C1/solo: suo L3; corr. ex suo a. m. C1/*
intemperato (98) corr. ex imperat P1 99 facit *om. P1/post si add. enim R/a inter. a. m.*
S/expresses (100) corr. ex depresso a. m. C1 100 et non: nec C1EErL3P3R 103 est
 ... solo: ex situ solo est error C1EL3P3R 104 sito: fixo C1EL3P3R 105 elongatum
 fuerit (106) *transp. R* 106 fuerit¹ *om. C1EErL3P3R/lene: lenis P3* 108 *ante situ add.*
ex L3/reducto: redacto C1L3P1S 110 raritate et soliditate: soliditate et raritate P1/
 fiet: fit P1/immoderamine (111): immoderatione P1 111 *post si add. enim R/*
descenderit: descenderet C1 112 lateat: latet C1/sit *corr. ex fit a. m. C1* 113 *post*
illius add. lucis C1EErL3P3R/post radiis add. incidentibus R/videntem alter. in viden
P1/vase vitreo transp. P1/vitreo: vitro Er

existimabitur a vidente vinum esse corpus solidum unum cum
 115 vase. Et non accidit error iste in transitu lucis per vas vitreum
 patente, unde error ex situ in raritate et soliditate.

[7.92] In umbra et tenebris: Corpore aliquo ab axe elonga-
 to, si fuerit in eo pars tenebrosa, putabitur fortassis umbra, et
 corpore aliquo circa posito, existimabitur umbram procedere
 120 ab illo.

[7.94-95] Si autem in corpore illo fuerit pars multum nigra,
 existimabitur forsitan in loco nigredinis perforatio per quam
 egrediatur tenebra, quod non accidet in corpore statuto in situs
 temperantia.

125 [7.96] In specie et deformitate autem error accidit ex situ.
 Cum corpus aliquod remotum fuerit ab axe, et sint in eo macu-
 le minute ipsum deturpantes, occultabuntur, et iudicabitur in
 corpore species, unde facies lentiginosa in hoc situ videtur
 speciosa. Similiter in hoc situ latet videntem lune adherens
 130 umbra, unde ascribitur decor lune sic inspecte.

[7.98] Si autem in corpore viso fuerint picture ei speciem
 redentes, nec sit corpus decorum nisi ex pretentu earum, cum
 ipse in hoc situ lateant visum, iudicabitur corpus deforme.

135 [7.99] Et est error in sillogismo quia per apparentiam tan-
 tum sit deformitatis vel decoris conclusio.

[7.100] In similitudine et dissimilitudine ex situ error oritur.
 Si longe ab axe stabiliantur duo concordantia in specie, figura,
 et colore, sed in eis sint modice et dissimiles note, iudicabitur
 in ea similitudo omnimoda, cum note ille videnti sint ignote.

140 [7.102] Si autem fuerit diversitas inter ea in specie, et col-

114 esse *om.* EP3R/corpus solidum *transp.* C1EL3P3R 115 non *om.* P1S/iste ... acci-
 dit (125) *om.* Er/in *om.* EL3P3R; *inter.* C1/lucis: luci R 116 post unde *add.* erit C1/ex:
 in R/in: ex R 117 tenebris: tenebrosis C1/post corpore *add.* enim R/ab ... aliquo
 (119) *inter.* L3 118 fortassis: forte P1L3/et *inter.* P1 119 circa posito: composito
 P1R; *alter.* ex circa posito in contra posito a. m. C1/umbram *om.* C1EL3P3R 121 nig-
 ra: magna EL3P1P3S; *corr.* ex magna a. m. C1 122 forsitan: forte P1 123 egredi-
 atur tenebra: egrediantur tenebrae R/accidet: accideret R/in¹ *om.* P1S 125 in ...
 accidit *om.* P1S/accidit: incidit C1EL3P3 126 fuerit: fuerint S/sint: fuerint R/post eo
add. multe EP3R/macule (127) *inter.* a. m. E/macule minute (127) *transp.* EP3R
 127 deturpantes: turpantes C1L3/iudicabitur: iudicabuntur P1S 128 lentiginosa
corr. ex litiginosa P3 129 post situ *add.* obliquo R/latet: latent R/adherens umbra
 (130): adherentes maculae R 130 ascribitur: describitur C1L3 131 viso *mg.*
 a. m. C1 133 situ: statu C1EL3P3R/deforme *corr.* ex difforme C1 135 sit: fiet
 C1EL3P3R/deformitatis *corr.* ex deformitas a. m. E/post decoris *scr.* et *del.* de S
 136 ante in *add.* iste (115) ... accidit (125) Er (in [115] *om.* /elongato [117/118]: elongatio/
 in eo [118] *om.* /nigra [121]: magna/ante forsitan [122] *scr.* et *del.* umbra/in¹ [123] *om.* /
 accidit [125]: incidit; *add.* in (125) ... accidit (125) P1S (et *om.* P1S/autem error *transp.*
 P1)/et dissimilitudine *inter.* a. m. S/post situ *scr.* et *del.* ex Er/oritur *om.* S 137 post si
add. enim R/stabiliantur: statuuntur R/in *om.* P3/specie figura *transp.* EP3R
 138 sint: sunt C1P1 139 post ille *add.* sint C1L3 140 in: et P1S/et: in C1L3; *om.*
 EErP3R/colore et figura (141): figura et colore EP3R

ore, et figura, sed in eis sint note similes, putabuntur ex toto dissimilia, cum aliqua dissimilitudo sit inter ea. Et ita est error in similitudine et dissimilitudine propter conclusionem ex apparentibus tantum factam.

- 145 [7.103] Et in omnibus predictis procreatur error ex solo situ intemperato, quoniam eo intra temperamentum sito, aliis sicut sint manentibus, non accidet erronea estimatio.

[Distinctio 3]

Lux a temperantie finibus egreditur, et ob hoc solum in omnibus quorum fit adquisitio per sillogismum error procreatur.

- [7.104] In longitudine ex lucis parvitate: Si in longitudine
5 temperata non multum circa fiat hominum dispositio ut sit unus post alium, et visu huic dispositioni de nocte adhibito, videbuntur sibi coherere incomprehensa inter eos distantia propter debilitatem lucis, que pateret si lux esset fortis. Qui homines, si in eandem partem moveantur equali motu, simul
10 semper moveri putabuntur.

[7.106] In situ: Si in nocte non obscura aliquid modicum a visu declinatum opponatur visui, existimabitur in eo situs rectitudo propter debilitatem lucis egressam a temperamento.

- [7.107] Similiter figura multorum laterum equalium circularis apparebit de nocte inspecta, quoniam occultat angulos
15 lux nimium debilis.

[7.108] Pari modo, spera sic visa reputatur superficies plana, quia occultatur visui partium eminentia.

- [7.110-111] In magnitudine: De nocte inspecto homine, et
20 viso nemore aut remoto ab eo pariete, videbitur propinquitatis hominis ad nemus vel parietem, cum lateat visum distantia

141 sint: sunt P1/note inter. a. m. S/post toto scr. et del. s Er 142 post aliqua add. eis
C1/dissimilitudo corr. ex similitudo C1Er/est om. C1EErL3P3 145 procreatur: pro-
creetur L3; corr. ex procreetur a. m. C1/error om. C1L3 147 sint: sunt C1EErL3P3R/
accidet: accidit C1EErL3P3R 1 temperantie corr. ex temperantia L3/ob: ab S
4 ex corr. ex et a. m. C1/post si add. enim R 5 temperata corr. ex tantum S/circa: certa
SR; alter. in certa C1P3 (a. m. C1)/hominum: homini ErP1P3 6 et: vel EErL3P3; alter.
ex vel in parum a. m. C1/post et add. non ErL3 (scr. et del. L3) 7 coherere: cohere P3/
post coherere add. et R/incomprehensa: ita comprehensa Er 8 que: et P1S/post fortis
scr. et del. si h P1 11 post situ add. ut R/aliquid corr. ex aliud Er/modicum: mo-
dice R 12 post visui scr. et del. es P3/rectitudo (13) alter. ex rectudo in erectudo S
13 egressam: egressae R 15 inspecta: aspecta R 17 superficies corr. ex
species P3 18 visui: visum Er; visu S 19 de: ut R 20 post nemore add. et
E/remoto corr. ex remote a. m. C1

eorum, licet sit plurima. Et forsā exhibit idem radius super caput hominis ad altitudinem nemoris secundum quantitatem distantem a nemore, et in hoc situ videbuntur eiusdem esse
 25 altitudinis, aut forsitan homo videbitur maioris, quod non accideret si lux in temperamento esset, quoniam distantia hominis ad nemus etiam discerneretur, et altitudo uniuscuiusque secundum terram apparentem mensuraretur.

[7.112] In distinctione, numero, continuitate erit error ex
 30 lucis debilitate. Si de nocte videatur tabula in qua sit linearum obscurarum protractio, ut sit ad mensuras capiendas, putabit forsā videns divisiones esse vel fissura; et ita error in distinctione, quia continuum apparet divisum, et in numero, quia pluralitas in uno.

35 [7.114] Similiter, existente visu in lucis fortis reflexione, si adhibeantur corpora modicum distantia, apparebunt continua; et ita error in continuitate propter lucem nimium, aut fortem, aut debilem.

[7.116] In motu aut quiete accidit error in luce. Si de nocte
 40 comprehenderit visus hominem et remotum ab eo nemus, occultabitur distantia hominis ad nemus. Et si moveatur videns ad hominem illum, quanto magis ad eum accesserit distantiam illam certius videbit, unde, cum prius, simul cum nemore appareret ei homo visus. Et quanto ad eum accedit plus videtur
 45 a nemore remotus, et cum certum sit ei nemus immotum manere, sillogizabit hominem visum a parte nemoris incedere, licet veritas habeat ipsum immotum esse, quod non accideret in temperata luce.

[7.117] In quiete: Homo de nocte visus non plene compre-

22 licet sit *om.* P3/sit *om.* C1EEr; *inter.* L3/plurima: plana P3; *corr.* ex plura L3; *alter.* ex plura in plana a. m. E/forsan: forte P1; forsitan S 23 ad: et C1EErL3P3 24 distantem: distantie EErP3R/situ: casu C1EErL3P3/videbuntur *corr.* ex debuntur a. m. S/eiusdem esse *transp.* EP3R 25 aut: et C1P1S/forsitan: forte P1/post videbitur *add.* esse R/post maioris *add.* altitudinis C1 27 etiam *om.* EErP3R/uniuscuiusque *corr.* ex uniuscuiusque S 28 secundum *corr.* ex super C1 30 ante si *add.* ut R/videatur: videantur C1P1 31 obscurarum *om.* P1; *inter.* a. m. S/ut . . . capiendas *om.* R/ut sit: insit Er/ad *om.* P1 32 forsā: forte P1; forsitan S/divisiones *corr.* ex dicens L3/fissura: fissuras R/ita: iste P1S 33 quia¹: quod P3/divisum *om.* P3/et *om.* P1S 34 pluralitas: pluritas EP3 37 post et *scr.* et *del.* pri S/post error *add.* est R/nimium: nimium P1 38 aut debilem *mg.* L3 39 aut: et R/in²: ex C1EErL3R/de: enim R 40 comprehenderit: comprehendit C1L3 42 eum: illum R/post accesserit *add.* tanto R 43 certius *corr.* ex tertius a. m. C1/nemore *corr.* ex nemor P3/appareret (44): apparet E 44 ei homo *transp.* S/et *om.* P1RS/quanto: quando R/accedit: accidit L3S 45 et cum *transp.* EP3/cum *om.* Er; *inter.* L3 46 ante sillogizabit *scr.* et *del.* simil S/a parte: ad partem C1EErL3P3 47 ipsum: hominem P3/esse: et E/quod: qui error C1EErL3P3R 49 post quiete *add.* ut R/plene *om.* L3

50 henditur, unde si modicum moveatur, non discernetur motus,
et putabitur quiescere.

[7.118] In asperitate et lenitate erit error. De nocte visi
enim asperitas iudicabitur forsitan erit lenitas, aut econtrario
secundum quod fuerit rei vise qualitas.

55 [7.119] In raritate et densitate: De nocte enim remissa
iudicabitur in corpore multum raro raritas, quia, cum post
ipsum non plena fiat comprehensio solidi, existimabitur remis-
sionem raritatis eius viam negare visui. Corpus vero modicum
rarum iudicabitur solidum.

60 [7.121] In umbra et tenebris: Si in pariete albo fuerint par-
tes obscure, et cadat super parietem illum lux candeles, iudica-
bit forsitan videns obscuritatem illam esse umbram, et videbi-
tur ei forsitan quod procedat apparens umbra a vicino pariete;
et ita error in umbre estimatione.

65 [7.122] Similiter, si fuerit in parte parietis nigredo multum
intensa, existimabitur forsitan vacuitas foraminis iter prebens
egredientibus tenebris. Et si tota parietis superficies afficiatur
intensa nigredine, totus forsitan putabitur tenebre, ut accidit in
pariete cooperto ignis fuligine, viso sub debili luce.

70 [7.124] In specie et deformitate: Palam quod de nocte vi-
detur facies formosa, licet in ea sint macule, sicut lentiginosa.

[7.125] Et si fuerint in re visa picture subtiles totalis speci-
ei cause, cum in nocte visum lateant, videbitur res deformis.

[7.127] In similitudine et dissimilitudine: In corporibus
75 eiusdem speciei, coloris, et figure in quibus partialis diversitas
per latentes notas in debili luce omnimoda iudicabitur simili-
tudo.

[7.128] Et si diversa fuerint corpora in specie, colore, et

50 moveatur: videatur ER; corr. ex videatur a. m. P3/discernetur: discernitur EP3R/post
discernetur scr. et del. et C1/motus corr. ex visus S/motus et (51) transp. EL3P3R
51 et inter. a. m. C1 52 visi: ubi C1; nisi ErP1; visa R; corr. ex ubi a. m. S/visi enim (53)
transp. R 53 iudicabitur: iudicatur EP3R/forsitan: forte P1; forsan R/erit om.
EErL3P3R; inter. a. m. C1 54 qualitas: quantitas EP3; corr. ex equalitas L3 55 den-
sitate: lenitate Er; corr. ex lenitate L3/post densitate add. fit error C1 56 iudicabitur:
iudicantur S/cum om. P1/post inter. a. m. E 57 estimabitur: estimabit C1EErL3P3/
remissionem (58): remissio R 58 raritatis: raritas EP3/post eius scr. et del. viam P3
59 iudicabitur: videbitur C1EL3P3R 62 forsitan: forte P1 63 forsitan: forte P1/
procedat: procedit P1 64 post error add. est R 65 si inter. P3/in parte om. P1S/
nigredo: ingredo Er 66 intensa om. R/forsitan: forte P1 67 afficiatur: corr. ex
efficiatur C1L3 68 forsitan: forte P1 69 cooperto: cooperte L3; corr. ex cooperte
a. m. C1/post fuligine add. et C1EL3P3R/sub: in C1EL3P3R 70 post palam add. enim
R/quod: et L3 71 sint: sunt P1/post sicut add. in R 75 ante eiusdem add. enim
R/post quibus add. est R 76 iudicabitur: videbitur C1/iudicabitur similitudo (77)
transp. EP3R/iudicabitur ... omnimoda (80/81) mg. a. m. E 78 post specie add. et P1/
et² om. C1ErL3S

80 figura, sed ex aliquibus notis conformitas partialis propter occultationem notarum ex remissione lucis iudicabitur omnimoda diversitas corporum.

[7.130] Et palam in omnibus predictis errorem accidere ex sola debilitate lucis, cum enim ipsa inter terminos temperantie fuerit sita, error non accideret aliis immotis.

[Distinctio 4]

Quantitas egreditur a temperantia, et ille egressus causa est erroris in omnibus quorum fidem facit sillogismus.

5 [7.131] Error erit in longitudine ex causa predicta. Si videntur duo homines a longitudine temperata, et si in suo genere maxima, et unus paululum fuerit ante alium, non discernetur via inter eos sita, unde unus eorum apparebit circa alium. Et accidit error quoniam distantia eorum, cum multum sit parva, non est proportionalis totali eorum a visu elongationi, licet
10 elongatio sit temperata.

[7.133] Est autem error in longitudine quoniam homines illi iudicabuntur ab oculo eque remoti, et ita quantitas unius longitudinis maior quam sit in veritate, unde est error in longitudine.

15 [7.134-135] In situ propter quantitatis parvitatem est error. Quoniam si granum sinapis fuerit ab oculo declinatum, tamen videtur rectum, quoniam pro parvitate nimia non potest deprehendi declinatio huius grani super lineam intellectualem in quam axis communis cadit orthogonaliter, quoniam non
20 plene discernitur longitudo inter hanc lineam et extremitates grani, cum sit minima, et secundum hanc longitudinem consideratur declinatio eius super lineam illam. Et secundum hanc lineam consideratur semper declinatio rei vise respectu visus

79 sed: si P3/post conformitas add. est R 80 remissione: remotione P1S 83 enim om. EErL3P3R; mg. a. m. C1 84 fuerit om. EErL3P3R; mg. a. m. C1/fuerit sita transp. C1/accideret: accidat R 1 post ille scr. et del. eg P3 2 egressus corr. ex egressa L3/causa corr. ex causam C1/causa est transp. C1L3 3 quorum: quibus R 4 error inter. L3/post error mg. enim a. m. C1/error erit transp. C1/ante ex add. et S/predicta corr. ex predicta a. m. E/ante si add. ut R 5 si om. P1R 7 unde om. P1S; corr. ex unum a. m. C1/unus: unius Er/et: vel L3; corr. ex vel a. m. C1 10 temperata: intemperantia P1S; corr. ex intemperata C1 13 est om. EErL3P3R/est error: error erit C1 15 quantitatis parvitatem: quantitatem longitudinis L3 16 si . . . sinapis: granum . . . si EErL3P3R/fuerit: fuit L3 17 nimia corr. ex minima P1/non: ut Er 18 deprehendi: comprehendi C1L3/grani om. P1 19 quam: qua P1S/orthogonaliter: dico generaliter Er/ante quoniam scr. et del. i Er 20 hanc mg. a. m. C1 21 minima: nimia ErL3; corr. ex nimia a. m. C1 23 semper om. P3

utriusque, et ita error in situ ex quantitate immoderata.

25 [7.137] In figura: Cum res visa fuerit multum parva, si fuerint in ea anguli, occultabuntur visui, unde fortassis eius forma, cum non sit, existimabitur rotunda aut longa.

[7.138] Et si fuerit in ea aliqua incurvatio modica, latebit visum, et existimabitur superficies eius plana, unde palam
30 quod error in figura.

[7.140] In quantitate quantitas errorem invehit. Propositis visui duobus corporibus quorum unum modicum excedat aliud, aut in longitudine sola aut in latitudine, forsitan iudicabuntur equalia in omni dimensione. Et est error iste quoniam excrementum unius dimensionis super aliam evasit fines temperantie respectu visus cum sit ei insensibile pre nimia sui diminutione. Ob hoc necessarie sunt mensure ut verificentur quantitates corporum cum non adquiratur certitudo per visum.

[7.142] In divisione error accidit. Capillo adherente vasi
40 vitreo, apparebit divisio esse in vitro et fissura cum ibi sit continuitas vera. Et provenit hoc ex capilli tenuitate, quoniam, si adhererit vitro quantitas corpulenta, non existimabitur in eo fissura.

[7.143] In continuitate: Si pretendantur visui folia pargameni tenua, equalis altitudinis, bene compressa, et ignoret videns esse folia, iudicabit ipsa esse continua et unum corpus efficere. Et est erroris causa quantitas vie interiacentis folia que pre sui parvitate non percipitur a vidente. Et eadem erit causa erroris numeri que continuitatis.

50 [7.145] In motu: Si moveantur duo quorum unum paulu-

24 *post ita add. est P1/post error add. est R* 25 *post figura add. erit error C1/multum: valde P1* 26 *fuerint: fiunt C1L3/anguli rep. C1EP3R/fortassis: forte P1; fortasse R*
28 *aliqua om. C1EErL3P3R/incurvatio corr. ex curvatio C1* 29 *plana mg. a. m. C1/post palam scr. et del. et Er* 30 *quod error alter. in error quod Er/post error add. est C1R* 32 *ante visui add. enim R/modicum: modice R/aliud (33) om. EP3*
33 *aut: ut C1; om. R/sola . . . latitudine om. P3; inter. a. m. S/forsan: forte P1; forsitan EP3R* 34 *in om. EP3R/excrementum (35): incrementum C1L3/aliam: alium L3/post aliam scr. et del. eq C1* 36 *pre nimia: propter nimiam P3/sui: sua R/diminutione (37): dimensionem EL3P3; corr. ex dimensione a. m. C1* 37 *mensure corr. ex figure EP3/verificentur: inficientur P1* 39 *post capillo add. enim R/adherente corr. ex adhem P3/vasi om. R; corr. ex vase L3* 40 *vitreo: vitro R/fissura: fixura Er*
41 *tenuitate alter. in parvitate a. m. S* 42 *adhererit corr. ex adherit P1/adhererit vitro transp. P3/corpulenta corr. ex copulenta P3* 43 *fissura: fixura Er; corr. ex fixura L3*
44 *ante si add. erit error C1/post si add. enim R/pretendantur: pretendant C1/visui: visu Er; om. L3* 45 *altitudinis: latitudinis R/compressa corr. ex compresse Er/ignoret: ignoratur P1; corr. ex ignorent C1* 46 *esse² om. C1ErL3S* 47 *erroris: entoris Er/causa quantitas transp. C1L3/interiacentis: interiacentes Er; corr. ex interiacentes C1/ante folia add. inter R* 48 *sui: sua R* 49 *erroris om. L3; mg. a. m. C1* 50 *post si add. enim R/quorum: quarum Er/post unum add. moveatur R/paululum (51): paulum ErP1S; paulo R*

lum velocius alio, putabit videns equalem esse motum eorum, quod est cum insensibile sit videnti unius super alium excrementum.

[7.146] Similiter quantitas excessus vie quam incedit unus
55 super eam quam incedit alius imperceptibilis est visui, unde iudicatur equalitas viarum et motuum.

[7.147] In quiete: Cum offertur visui animal multum parvum, forsitan movebitur pars eius aliqua, et ipsum iudicabitur immotum, cum motus partis lateat visum.

60 [7.149] In asperitate et lenitate: Cum enim occurrerit visui res multum parva, iudicabitur forsitan lenitas ubi fuerit asperitas, aut econtrario. Quoniam, ut dictum est, asperitas non comprehenditur in corpore nisi ex umbra quarumdam partium super alias, vel eminentia earum et depressione aliarum, quod
65 totum occultatur iudicio videntis pre nimia parvitate corporis.

[7.151] In raritate et soliditate: Si quis intueatur corpus valde parvum politum, ut ab eo possit lux reflecti, margarite simile, rarum esse iudicabit cum non sit.

[7.152] Similiter, viso corpore raro multum parvo, quia
70 post ipsum non sit corporis solidi comprehensio, simulatur esse solidum.

[7.154] In umbra et tenebris: Si in pariete albo visui opposito fuerit punctorum valde nigrorum distinctio, adhibita solis luce, sed directe in pariete cadente vel prope, existimabuntur a vidente singula puncta singula esse foramina postquam erumpant tenebre, unde error cum tenebrarum estimatione ex sola punctorum parvitate, que non accideret si nigredo quantumcumque intensa magnam partem parietis inficeret.

51 putabit: putabis *Er* 52 quod: quia *R/est om. L3R; inter. a. m. Er/cum om. R; alter. in est L3/sit: est R/videnti om. R/post unius add. motus C1* 54 ante similiter *add. videnti R/quantitas: quantitatis P1* 55 incedit: incedat *P1S* 57 post quiete *add. fit error C1/post cum add. enim R/animal: aliquid R* 58 forsitan: forte *P1/eius om. P1S/aliqua corr. ex alia L3/iudicabitur: iudicabatur P3; corr. ex indicabitur a. m. E* 59 visum: visuum *E; corr. ex visuum P3* 61 forsitan: forte *P1; forsitan RS/ubi corr. ex nisi L3* 62 aut: et *C1EL3P3R/econtrario corr. ex econverso C1* 63 quarumdam: quarumdem *S* 64 post super *scr. et del. aq C1/post alias scr. et del. e C1/et: vel EP3* 65 occultatur: occultabitur *EP3/post nimia scr. et del. asper P3* 66 post quis *add. enim R/intueatur: intuetur Er* 67 possit lux *transp. C1EErL3P3R/post reflecti add. sicut est R* 68 iudicabit: iudicabitur *P1RS/non corr. ex vero a. m. C1* 69 similiter *corr. ex aliter a. m. S/multum parvo: multo P1/quia: quod C1R* 70 simulatur: existimatur *R; alter. in silogizatur a. m. C1* 72 ante si *add. fit error C1/post si add. enim R/pariete corr. ex parte a. m. C1/albo: aliquo C1/opposito (73) corr. ex oppositio a. m. C1* 73 post fuerit *scr. et del. po P3/nigrorum: magnorum EP3* 74 pariete: parietem *EP3R* 75 postquam (76): postquae *R* 76 erumpant: erumpnant *C1L3/unde corr. ex une S* 77 que: qui *R* 78 quantumcumque . . . nigredo (79) *mg. a. m. S/magnam: magna P1P3S/post partem add. magnam P3/inficeret: interficeret P1*

[7.155] Si autem fuerit in punctis illis nigredo non adeo
 80 intensa, reputabuntur quidem puncta illa foramina in quibus
 sit umbra cum lux non penetret ea, sicut solet accidere luce
 super multorum foraminum superficiem cadente, unde error
 umbre ex sola punctorum diminutione.

[7.156-157] In specie et deformitate: Cum pre sui parvi-
 85 tate occultentur visui deturpantes corpus visum macule, acci-
 dit erroneum speciei iudicium, quia sumitur ex apparentibus
 tantum, sicut est error in deformitate cum propter parvitatem
 latent picture decorem ingerentes rei vise.

[7.159-160] In similitudine et dissimilitudine: Cum note
 90 minutissime inter aliqua corpora similitudinis aut dissimili-
 tudinis fuerint cause, quia pretereunt visum pre parvitate sua,
 iudicabitur similitudo aut dissimilitudo omnimoda. Et sume-
 tur iudicium ex apparentibus tantum.

[7.162] In omnibus predictis est error in sillogismo ex par-
 95 vitate corporis; cum ea temperata, non accidit error, aliis im-
 motis.

[Distinctio 5]

*Soliditas aliquando egreditur temperamentum
 et errorem inducit in quolibet eorum que
 comprehenduntur per sillogismum.*

[7.163] In longitudine: Si minima fuerit corporis soliditas,
 5 et est ut sit valde rarum sicut est cristallus purus, et sit post
 ipsum lucidum luce forti corpus, non plene comprehenditur
 cristallus; sed quasi non esset intermedium comprehendetur
 corpus per ipsum. Unde, cum quasi non sit fiat rari acquisitio,
 non plena erit longitudinis eius ab eo comprehensio, unde error
 10 in longitudine, quare, si corporis rari situs fuerit declinatus,

80 post intensa scr. et del. p Er 82 multorum: multarum S/superficiem: speciem
 EErL3P1P3RS; corr. ex speciem a. m. C1 84 et om. ErL3P1S/ante cum add. accidit
 error C1/sui: sua R 85 occultentur: occultantur C1EL3P3R; occultatur Er/macule:
 macula S 86 erroneum corr. ex errorem L3/post erroneum scr. et del. erroneum C1/
 speciei: specie EP3/iudicium corr. ex iudicatur a. m. C1 88 latent: lateant EP3
 89 ante cum add. accidit error C1/post cum add. enim R 90 aut corr. ex et P1
 91 post pre scr. et del. sui P1 92 aut corr. ex a a. m. Er/aut dissimilitudo om. C1;
 inter. L3 95 post ea add. existente EP3R/accidit: accidat C1EErL3P3R/post accidit
 add. nisi C1L3 (scr. et del. C1) 1 aliquando: autem C1L3 4 ante si add. erit error
 C1/minima: minuta L3; corr. ex minuta a. m. C1 5 sit¹ om. P1S 6 ipsum: ipsam
 corpus R/forti: forte P1; corr. ex forte C1/corpus om. R/plene om. R/comprehenditur:
 comprehendetur EP3R 7 non: nullum R/comprehendetur: comprehenditur C1
 8 per ipsum corr. ex ipsum per C1/ipsum: ipsam R/post sit add. sic P3 9 longitu-
 dinis . . . eo: ab eo longitudo P1/eius om. S/ab eo om. L3

occultabitur videnti declinatio, et iudicabitur forsitan rectitudo, unde error in situ et etiam in longitudine, quoniam una eius extremitas eiusdem longitudinis reputabitur cum alia, cum sint diverse.

- 15 [7.164-165] Verum quoniam quantitas corporis comprehenditur ex longitudine et anguli sub quo videtur capacitate, ignorata longitudine, accidit error in quantitate. Modo consimili accidit error in figura, si enim in corpore fuerint anguli, occultabuntur videnti, unde sexquiangula forma putabitur
20 sperica. Et si modica fuerit incurvatio in corpore, latebit, et iudicabitur corpus planum esse.

- [7.166-169] In divisione: Si fuerit per corpus hec linea nigra, apparebit enim corpus divisum in loco in quem cadit linea, unde existimatur plura. Si vero fuerint duo corpora talia
25 modicum a se distantia, reputabuntur continua, unde error in continuitate. Et palam quod ex hiis error erit in numeri comprehensione, cum unum plura vel plura unum appareant.

- [7.170] In motu erit error ex immoderamine raritatis. Si opponatur foramini corpus valde rarum, ut cristallus, et huius
30 corporis extremitates lateant visum, et post corpus hoc moveatur aliud, putabit videns corpus rarum moveri cum sit immotum, quod non accideret ipso temperate solido.

- [7.171] In quiete accidet error ex eadem intemperantia. Si includatur in manu corpus valde rarum coniunctum manui, et
35 ab ea recedat, et moveatur intra manum revolutionis motu, immota manu, ita tamen quod appareat divisio aliqua inter ipsum et manum, iudicabitur corpus illud immotum. Quoniam

11 forsitan: forte P1 12 post et add. est C1P1/post etiam add. error C1EErP3R/una
corr. ex vana L3 13 post longitudinis add. a visu C1/cum² corr. ex que L3; cum sint:
tamen sunt P1S; corr. ex tamen sunt a. m. C1 15 verum: deinde EL3P3R; corr. ex vel
unum a. m. C1/post verum scr. et del. deinde C1 17 longitudine inter. ErL3 (a. m. Er)
18 accidit: erit C1EErL3P3R 19 sexquiangula: sexangula R; corr. ex sexquianguli
a. m. C1 20 et' om. EP3R/post si add. vero EP3R (inter. E; inter. a. m. P3) 22 divi-
sione: distinctione EL3P3; figura Er/post divisione add. vel distinctione C1/ante si add.
erit error C1EErL3P3R/post si add. enim R/per: pars C1EErL3P3/corpus: corporis
C1EErP3; alter. in corporis L3/hec: huius C1EL3P3; huiusmodi Er; magnae raritatis R/
nigra (23) corr. ex recta C1 23 enim om. R/cadit: eadem Er 24 unde... plura om.
R/existimatur: existimabitur C1EErL3P3/plura: plana EErL3P3; alter. ex plana in divisa
a. m. C1 26 quod: quia L3/post hiis scr. et del. erit C1/error erit transp. C1ErL3P3R
27 post cum add. vel C1EErL3P3R/appareant: apparebunt EP3R 28 immoderamine:
immoderatione EP3R; corr. ex immoderatione P1 29 opponatur: opponuntur L3/
opponitur P1S/ut: vel L3/huius: huiusmodi L3 31 aliud rep. C1 32 ipso: ipsum
E/post ipso add. corpore C1/solido om. P1S/post solido add. existente C1 33 accidet:
accidit R/intemperantia: temperantia ErP1S/post si add. enim R 34 includatur...
rarum: corpus valde rarum... in manu R/manui: manu P1S 35 intra: inter EL3P3;
corr. ex inter C1/post intra scr. et del. in C1/revolutionis: resolutionis EP3 36 quod: ut
R/appareat corr. ex apparet a. m. C1 37 iudicabitur corr. ex videatur a. m. C1/
immotum: motum P3

non potest in eo comprehendi motus nisi mutatione situs partis alicuius respectu manus vel partis eius, et quia omnimoda
 40 est similitudo in partibus vel pretenditur propter raritatem, non potest discerni alicuius partium situs, quare nec motus.

[7.173] In asperitate: Si in corpore multum raro fuerit asperitas non magna, putabitur forsitan lene. Si vero fuerit lene et post ipsum statuatur corpus asperum aut corpus diversorum colorum, existimabitur hoc rarum asperum, unde error
 45 in lenitate.

[7.175] In raritate: Si post corpus valde rarum sit aliud corpus rarum non multum et colore forti coloratum, apparebit primum non multum rarum; sed existimabitur eius raritas secundum raritatem postpositi, unde vitrum alii vitro superpositum non apparet ita rarum sicut apparet eo solo visui adhibito, unde error in raritate.

[7.176] Si autem post primum rarum statuatur corpus solidum, iudicabitur primum solidum, unde error in soliditate.
 55 Pari modo, si vas valde rarum contineat vinum, cum post illud non percipiatur lux aut corpus aliud, iudicabitur forsitan totum cum vino vitrum esse unum corpus solidum.

[7.178-179] In umbra erit error ex raritate. Luce solis in domum aliquam per foramen aliquod descendente et super
 60 fenestram vitream cadente, tamen domus illa sit umbrosa, apparebit super fenestram illam umbra, licet in veritate lux super ipsam incidat, que quidem lux comprehenderetur si solidum esset fenestre corpus, quoniam non transiret, et ita super solidum appareret, unde error in umbra.

38 in eo comprehendi: comprehendi in eo C1L3/post nisi add. in P1S/post situs add. partium EP3R/partis (39): parti P1S 39 omnimoda: omnimodo P1S 40 post vel add. pre P1/raritatem: parvitatem P1 41 quare: quia P1 42 ante si add. erit error C1; add. est laenitate R/post si add. enim R; scr. et del. post corpus C1 43 post asperitas scr. et del. in asperitate sit in corpore C1 43 post putabitur scr. et del. non Er/forsitan: forte P1/si . . . lene (44) om. P1 44 et om. EL3P3; mg. a. m. C1/post . . . statuatur: statuatur . . . ipsum R 45 post colorum scr. et del. re P1/post hoc add. corpus R/post rarum add. et laene R 46 in om. EP3 47 post si add. enim R 48 forti corr. ex forte C1 49 primum: post P3/sed: si E; inter. C1 50 postpositi corr. ex positi post a. m. S/ante unde add. corporis C1L3 (inter. L3)/vitrum: vitri P1S 51 apparet ita rarum corr. ex apparum L3/ita rarum mg. a. m. C1/ita . . . apparet om. P3/apparet?: appareret ER; om. C1 54 post unde add. est C1/soliditate corr. ex solita P3 56 forsitan: forte P1; forsan R/totum (57) om. C1L3P3 58 erit om. P1S/post luce add. enim R 59 descendente corr. ex descendere a. m. C1; corr. ex ascendente L3/et mg. a. m. C1 60 post fenestram add. aliquam C1L3/illa mg. a. m. C1 61 post fenestram scr. et del. tam P1 62 super: in EEerL3P3R; corr. ex in a. m. C1/ipsam: illam Er/incidat: incidit EEerP1P3S/comprehenderetur: comprehenderatur S; corr. ex comprehenderentur C1 63 non transiret: pertransiret S/ita om. P3 64 post super add. in P3/appareret: apparet EL3P3; corr. ex apparet C1/in inter. a. m. Er

65 [7.180] In tenebris: Luce solis in aquam fluminis non descen-
dente, aut in mare, sicut accidit hora matutina et vespertina,
si fuerit claritas in aqua, apparebit tenebrosa. Et quanto fuerit
clarior, tanto putabitur tenebrosior.

[7.182] Et accidit hoc quoniam pars aque superior umbram
70 iacit super proximam partem inferiorem, et illa proxima super
aliam inferiorem propinquam, et ita per singulas usque ad fun-
dum.

[7.183] Et licet singularum partium umbra in se sit modica,
tamen coniuncte unam efficiunt maximam, sicut palam est in
75 colore vini accidere. In modica enim quantitate vini color est
debilis, et in multa, licet eiusdem modi, fortis. Causa autem
quare in mari umbra iacente videantur esse tenebre in maris
claritate est quoniam intensa claritas intensam redit raritatem,
unde visui maiorem pretendit penetrationem. Unde fit
80 acquisitio plurium maris partium umbram facientium quarum
umbrarum aggregatarum perceptio inducit fidem tenebrarum.

[7.184] Si vero mare fuerit turbulentum, propter diminutam
raritatem penetrabit visus paululum, et comprehendet modi-
cam aque partem. Et licet faciat umbram, cum ipsa sit remis-
85 sa, color illius partis vincit umbram, in turbida enim color
apparet, in clara nullus. Unde et propter apparentem turbide
colorem et propter umbre partis apparentis remissionem non
comprehenduntur in aqua tenebre, unde ipsa turbida appare-
bit clara, et clara tenebrosa. Solis autem radio cadente super
90 faciem maris, cum ei per raritatem ipsius pateat transitus,
abicietur omnis tenebra et umbre apparentia.

[7.185-187] In decore et deformitate: Si in vase multum

65 *post luce add. enim R/aquam: aqua P1S* 66 *aut corr. ex autem C1* 67 *ante si add. et C1EL3P3R/in aqua mg. C1L3 (a. m. C1)/aqua: qua Er/et . . . tenebrosior (68) mg. a. m. C1/quanto: quando P1; corr. ex quando L3* 68 *post putabitur add. magis C1/tenebrosior: tenebrosa C1; corr. ex tenebrosa P3* 69 *ante hoc add. ex P1S/hoc om. Er; mg. a. m. C1; inter. L3* 71 *aliam corr. ex illam a. m. C1/propinquam corr. ex propinquitatem S/fundum (72): summum P1* 73 *et mg. a. m. C1/singularum: singularium Er; alter. ex singulariter in singularium a. m. C1* 75 *vini¹² alter. in vinis a. m. C1/quantitate vini transp. Er/vini² inter. L3/color om. EL3P3/color . . . debilis (76): est . . . color C1* 76 *licet eiusdem transp. P3* 77 *umbra: umbram EErl3P1RS/iacente: iacienti P1S; alter. in oriente a. m. E* 78 *est inter. C1* 79 *pretendit: redit C1EL3P3R; concedit Er* 80 *plurium corr. ex plurimum S/quarum: quam EP3; quare P1; quoniam R; corr. ex quare a. m. S* 81 *umbrarum: umbram P3* 83 *comprehendet: comprehendat P1* 84 *post licet add. modicam C1/cum . . . vincit (85) om. C1* 85 *umbram: umbra C1 (mg. a. m.)/post enim add. aqua C1R* 86 *post apparet add. in turbida EP3 (scr. et del. P3)/apparentem om. R/post turbide add. aquae R* 88 *turbida corr. ex turbidam P3/turbida apparebit (89) transp. P3; corr. ex apparebit turbida C1/apparebit clara (89) transp. L3* 89 *clara¹: colorata R/clara² om. S/solis corr. ex solum P1* 90 *ei corr. ex rei C1/pateat: patet C1* 91 *tenebra: transitus L3; tenebrarum R; corr. ex transitus a. m. C1/umbre: umbra P1S* 92 *ante et scr. et del. in eo S/si inter. E/post si add. enim R*

- raro sint particule vel incisure ipsi decorem inferentes, et imponatur vasi illi vinum turbidum et turpe, occultabuntur
 95 decoris cause, et iudicabitur vas deforme, ut aliquando accidit in vitreo vase. Econtrario, si vas tale deformet aliquie eius particule, et imponatur ei vinum clarum lucidum et in colore formosum, occultabuntur deformitatis cause, et reputabitur vas speciosum cum sit deforme.
- 100 [7.189] In similitudine et dissimilitudine: Si duo vasa multum rara convenient in forma, specie, raritate, sed discrepant in aliquarum partium dispositione, vino eiusdem coloris eiusdem claritatis implenta, latebunt cause diversitatis, et reputabuntur omnino similia.
- 105 [7.190] Si vero inter ea fuerit diversitas in specie et forma, sed in aliquibus partialibus convenientia, vino simili plena, putabuntur omnino dissimilia, unde error in similitudine et in dissimilitudine, quia sumitur iudicium ex apparentibus tantum.
- 110 [7.192] Et in omnibus predictis accidit error ex sola soliditatis intemperantia, quoniam, aliis in esse suo manentibus, non accidit error ea ad temperantiam revocata.

[Distinctio 6]

*Raritas aeris visum et rem visam intercidentis
 egreditur temperamenti proprii metas et
 errorem generat in omnibus quorum
 fidem visus efficit et sillogismus.*

- 5 [7.193-194] In longitudine: Si fuerit aer pruinusosus et obscurus, sicut in horis matutinis solet accidere, turre aliqua visui opposita in longitudine temperata, existimabitur plus a visu elongata quam habeat veritas, unde error in longitudine est, quoniam non comprehenditur longitudo inferioris terre secun-

93 sint: sunt C1L3/inferentes: afferentes R 95 ut corr. ex ubi a. m. C1 96 vitreo vase transp. P1/deformet: deformetur P1S/alique eius transp. C1EL3P3R/eius: omnis P1 97 ei: enim P3 99 speciosum: preciosum P1S 101 in forma om. L3; inter. a. m. C1/post specie add. et P1/discrepant: decrepant P3; discrepant R 102 post aliquarum add. rarum P1 103 implenta: impleantur R 106 ante vino add. et R/plena: impleantur R; corr. ex plene Er 107 similitudine: specie P1S/et in dissimilitudine (108) inter. L3 108 iudicium: indicitur Er 111 esse suo transp. R 112 accidit: accidet C1ErL3/post error add. ex ea sola soliditatis intemperantia EP3 (post intemperantia scr. et del. in P3) 1 intercidentis: interdicentis L3 2 temperamenti om. P1S 4 et om. EErP3; inter. L3; et sillogismus: per syllogismum R 5 si . . . longitudine (7) mg. a. m. E/post si add. enim R/obscurus (6): obscuris C1 6 turre: turri P1RS 8 habeat: habet P1/post est add. et est C1ErL3; add. et causa est EP3R 9 comprehenditur: complectitur P3; corr. ex complectitur a. m. E/secundum (10): super R

10 dum quam elongationis turris conviciatur mensura, et occulta-
tur terra ex raritate aeris diminuta, unde raritas est erroris
causa.

[7.195] Si autem in hoc aere declinetur modicum corpus
visum, occultabitur declinatio que pateret in aere claro, unde
15 error in situ.

[7.196] Et si fuerit in corpore gibbositas modica, apparebit
planum in tali aere, et si fuerint in corpore anguli, latebunt,
unde erroneum erit figure iudicium.

[7.197] In quantitate erit error ex tali aere, quoniam visum
20 maius apparebit quam in temperato aere, sicut accidit in cor-
poribus post aque raritatem comprehensis.

[7.198] Et si fuerit in corpore quasi linea nigra, putabitur
esse partium divisio, unde error in divisione.

[7.199] Et si fuerint duo corpora modicum a se disiuncta,
25 apparebunt in hoc aere continua, unde error erit in continui-
tate. Et ex hiis palam quod error est in numero.

[7.202] In motu: Si in hoc aere duo videantur quorum
unum alio paululum velocius moveatur, iudicabuntur forsitan
equales esse eorum motus, cum in temperato aere discerni
30 posset unius ad alium excessus. Et est error propter latens
excrementum vie unius super viam alterius.

[7.204] In quiete: Si quis post talem aerem a longitudine
temperata non parva videat aquam fluentem, aut iudicabit
eam immotam, aut, si fuerit fortis eius fluxus, minus quam
35 moveatur motam.

[7.206] In asperitate et lenitate: Quia in hoc aere videbitur
asperum lene propter latentes asperitatis causas, et visa re
polita, cum non discernatur reflexio in ea, existimabitur as-
pera.

40 [7.207-209] In umbra: Si post hunc aerem videatur corpus

10 conviciatur: coniciatur EP3; sumitur R 11 ex rep. S/diminuta: diminute E/erroris
causa (12) transp. R 13 modicum: modice R 14 in aere claro mg. a. m. C1/aere
om. C1; corr. ex aoere L3 16 post corpore scr. et del. anguli latebunt P3 17 planum
corr. ex plana P3 19 ex: in P1S 20 maius: magis EEr 22 quasi corr. ex
quas S 23 ante esse scr. et del. cor P1 24 post se scr. et del. esse C1/disiuncta:
distincta P1 25 hoc inter. a. m. C1/erit om. EErL3P3R; inter. a. m. C1 26 et om. C1/
est om. EErL3P3; inter. a. m. C1 27 post si add. enim R/hoc om. EP3 28 paululum:
paulo R/forsitan: forte P1; fortasse R 29 esse om. C1L3/post aere add. sic P1
30 unius: unus L3; corr. ex unus C1 32 in inter. L3/post quiete add. erit error C1/si
quis mg. a. m. C1/post quis add. enim R; scr. et del. si C1/post: per R/post longitudine scr.
et del. tem L3 33 post non add. tamen R/videat: videt P1S/aquam corr. ex quam S
34 immotam corr. ex immota P3/aut si: si autem P1S 36 lenitate corr. ex lenita P3
37 latentes corr. ex latentia a. m. C1 38 discernatur: discernetur C1/reflexio in ea: in
ea reflexio R 40 post si add. enim R

album in quo sint particule rotunde nigre, luce ignis in corpus
illud cadente ita tamen ut sit interpositio huius aeris, appare-
bit in locis illis umbra, aut forsitan reputabuntur foramina
viam tenebris erumpentibus prestantia, unde error in tenebris,
45 quare post hunc aerem corpus rarum apparebit minus rarum,
et forsitan putabitur solidum, et ita error in soliditate et raritate.

[7.211] In specie et deformitate per causas particulares
corpus decorantes vel deformantes in hoc aere latentes.

[7.213] In similitudine et dissimilitudine propter partiales
50 diversitatis aut convenientie causas inter duo corpora non
apparentes.

[7.216] In hiis omnibus provenit error ex raritate aeris sola
immoderata, cum, aliis immotis, in aere temperato non acci-
deret.

[Distinctio 7]

*Tempus extra temperamenti sui fines loca-
tum causa est erroris per singula quorum
fides in visu sumitur ex sillogismo.*

[7.217] In longitudine: Si subito intueatur quis aliquod
5 remotum a turre quod statim visui subripiatur, non poterit
plene discernere longitudinem inter illud et turrem, et iudica-
bitur forsitan aut minus remotum a turre quam esset in veritate,
aut magis. Et est quoniam in illa temporis instantia non per-
cipitur a vidente terra turri et rei vise intermedia secundum
10 quam sumatur distantie mensura, aut quoniam in tam brevi
tempore non potuit axis viam intermediam discurrere, unde
nec plene comprehendere, et ita error in longitudine.

41 sint: sunt P1 42 post ita scr. et del. quod cum non sit in ipso huius C1/tamen om.
C1/tamen . . . interpositio: que cum non sit in positio L3/ut: quod C1/ut . . . huius mg.
a. m. C1/huius: huiusmodi C1 43 forsitan: forte P1 44 erumpentibus:
irumpentibus P1S; erumpetibus P3/post in add. umbra et R 45 hunc aerem transp.
C1/ante corpus add. caliginosum C1 46 forsitan: forsitan C1P3; forte P1 47 in: et
P1S/post et scr. et del. fo Er/per: propter R 48 vel: et P3/deformantes corr. ex de-
forma a. m. C1 49 partiales: particulares R; corr. ex partialis a. m. C1 50 con-
venientie corr. ex continentie a. m. C1 51 apparentes: comparentes EErl3P3; alter. ex
cooperantes in comparentes a. m. C1 52 ante in add. et C1EErl3P3/hiis inter. a. m. S/
hiis omnibus transp. P3/provenit: prevenit P1 53 post cum add. aliis cum E; add. alias
cum P3 4 ante si add. ergo P1/si inter. a. m. C1/post si add. enim R/aliquod: ali-
quem P1S 5 turre: turri R/quod: et P1S 6 plene: plane P3/turrem: turrim C1R/
et²: inde C1 (mg. a. m.) 7 forsitan: forsitan C1; forte P1/aut om. P1; corr. ex autem C1/
remotum om. P1S/turre: turri R/esset: sit R 8 et corr. ex autem a. m. C1/post est add.
caussa R/post quoniam add. causa EP3 9 turri: intermedia inter turrim R/rei vise:
rem visam R/vise corr. ex visa C1/vise intermedia transp. EP3/intermedia om. R
10 sumatur: sumitur C1EP3R/tam om. R 11 potuit: poterit C1EL3P3R/discurrere:
discernere C1EL3P3R

[7.218] In situ: Cum aliquid subito occurrit visui et statim recedit, reputabitur forsitan rectum declinatum, aut econtrario.

15 [7.221] In figura: Si fuerit modica gibbositas in re subito visa latebit, et reputabitur res plana, aut latebunt anguli si fuerint in ea.

[7.222] In quantitate: Si quis tirsum ardentem moveat motu citissimo et intra viam modicam ut sepius vadat et revertatur per eam, apparebit via motus ignea, quoniam motus tirsii
20 ab uno vie termino ad alium sit quasi instanti.

[7.223] Unde propter temporis brevitatem non potest discerni vel quantitas vel motus tirsii, unde et hic error in motu.

[7.226] In divisione: Si aliquid subito visum a visu divertatur, et fuerit in eo linea nigra, putabitur esse divisio partium
25 illa nigredo.

[7.227-228] Et si corpora contigua aut valde propinqua subito videantur, existimabuntur continua, sicut accidit in scanni tabulis subito inspectis, unde error in continuitate.

30 [7.230] In motu: Cum duorum unum paulo velocius alio movebitur, motus in tempore modico comprehensi equales iudicabuntur, cum non tam subito comprehensibilis sit excessus.

[7.232] In quiete: Si aliquid modicum moveatur subito
35 visum, moveri non videbitur, quoniam via quam percurrit in tempore perceptionis sue imperceptibilis est visui pre sui parvitate. Superius autem explanatum est quod non comprehenditur motus in corpore nisi in sensibili tempore.

[7.233] Similis error accidit in rota modica. Cum citissime
40 volvatur, apparet immota cum non possit fieri comprehensio revolutionis eius in tempore tam parvo quam parvum est in

13 *post situ add. erit error C1* 14 *forsitan: forte P1/aut econtrario: ex contrario L3/post econtrario scr. et del. extremo C1* 15 *post figura add. accidit error C1* 16 *reputabitur: putabitur C1EErP3R/anguli: aliqui E* 18 *ante in scr. et del. in quantitate si quis Er/post quis add. enim R/tirsum: tionem R; corr. ex visum a. m. C1/moveat: moverit P1S; corr. ex movea C1* 19 *citissimo: cissimo P1/intra: in terra S/ut om. P1S* 20 *tirsi: tionis R; corr. ex visi a. m. C1* 21 *post quasi add. in R* 22 *unde: unum S/temporis brevitatem transp. C1EL3P3R* 23 *vel² inter. C1L3 (a. m. C1)/tirsii: tionis R; corr. ex visi a. m. C1/post motu add. est P1S; scr. et del. subito C1* 24 *aliquid: quid C1EL3P3R/ante subito add. enim R/subito mg. a. m. C1/divertatur (25): diversatur P1S* 27 *aut: vel R* 28 *continua: contigua P1/post in scr. et del. san C1* 29 *scanni: scamnorum R/post subito scr. et del. videan S* 30 *post duorum scr. et del. in C1* 31 *movebitur: moveretur R* 34 *post si add. enim R/modicum: modice R* 35 *visum: visu Er/videbitur: movebitur P3* 36 *perceptionis sue transp. R/visui: in visu C1* 37 *post superius add. etiam C1EErL3P3/autem om. Er* 38 *in sensibili corr. ex visibili a. m. C1/sensibili tempore transp. R* 39 *in: et Er/post cum scr. et del. non C1* 40 *volvatur: volvitur R/possit: sit P1S/fieri om. P1S* 41 *tempore tam: temperatam Er/post parvum add. illud P1S*

quo fit una eius revolutio.

[7.234] Idem error accidit in troco, unde error in quiete, quoniam non potest discerni mutatio situs partium troci, quare nec
 45 motus eius. Et si unius coloris fuerit trocus, palam quod non comprehenditur motus. Si vero plurium et diversorum colorum nec sic etiam apparebit motus, cum lateat colorum diversitas et pretendatur ex nimia festinatione confusa quedam colorum unitas.

50 [7.237] In asperitate: Cum subito videatur asperum, putabitur forsitan lene. Et si hoc modo videatur lene, non poterit in eo discerni lenitas aut asperitas, unde dubitatio et error.

[7.239] In raritate. Luce declinata super corpus rarum
 55 descendente subito visum, cum non percipiatur declinatio lucis, putabitur forsitan quod finis raritatis sit apparens raritas corporis. Quod, si in tempore modicum maiori adhibeatur visui, percipietur declinatio causa apparentie raritatis remisse.

[7.240] In soliditate: Si quis instantanter videat corpus rarum
 60 et post ipsum non discernat lucis transitum, putabitur esse solidum.

[7.241-242] In umbra: Si in albo pariete sint partes sub nigredine, descendente super ipsum ignis luce, subito vise, putabuntur esse umbre. Si vero nigredo visa fuerit intensa, existimabuntur foramina tenebris plena.
 65

[7.244-246] In specie et deformitate: Quoniam in tam parvo tempore non sunt comprehensibiles minute decoris vel deformitatis cause, sicut accidit cum aliquis movens per foramen intuetur faciem iudicat aliquando fedam formosam, vel
 70 econtrario. Et idem error accidit mota re visa, oculo immoto.

[7.247] In similitudine et dissimilitudine. Quoniam latent

42 quo: qua P1S 45 post non scr. et del. p C1 46 ante motus add. trocus P1S/
 plurium corr. ex plurimum C1/post colorum add. sit trocus C1 47 lateat: latet E
 48 pretendatur: pretenditur Er/colorum: color P1S 50 post cum add. enim R
 51 forsitan: forte P1/post videatur add. forte P1/lene² om. R 52 aut corr. ex ut a. m.
 C1/post aut scr. et del. aut S/et error (53) corr. ex error et Er 54 post raritate add. erit
 error C1/post luce add. enim R/post corpus add. remisse R 55 visum: visu P1
 56 forsitan: forte P1/finis: in fine R/raritas (57) corr. ex tanta a. m. C1 57 modicum
 maiori: paulo maiore R 58 visui: visus EP3R/percipietur: percipitur EP3/remisse:
 rei vise C1P1S; corr. ex rei vise L3/post remisse scr. et del. vel remisse C1 59 ante si
 add. accidit error C1/instantanter mg. a. m. C1/post instantanter add. motum C1/videat corr. ex
 videt a. m. E 60 ante esse add. illud R 62 ante si add. accidit error C1/pariete:
 parietes L3/nigredine (63): nigra EErL3P3R 63 subito: subite L3S 64 post
 nigredo add. earum C1EErL3P3R 65 ante foramina add. esse S (post esse scr. et del.
 umbre) 66 quoniam: quia R 68 movens: inspicies R 69 vel: et P1
 70 error om. P1S; inter. a. m. Er/re corr. ex rei S/immoto corr. ex moto L3

particulares similitudinis aut dissimilitudinis cause.

[7.249] Et in hiis omnibus ex solo tempore non moderato
75 accidit error, cum in predictis nulla accideret eo ad temper-
antiam reducto.

[Distinctio 8]

*Visus debilitas et immoderatio errorem
invehit singulis per sillogismum
in visu comprehensis.*

[7.250] In longitudine: Si opponantur visui duo corpora
5 quorum unum coloris fortis et remotius aliud coloris debilis et
oculo propinquius, cum non fiat comprehensio longitudinis nisi
facta collatione inter aliqua, incertam faciet collationem debili-
tas visus.

[7.251] Et quia certum est homini quod ex propinquieribus
10 certior fit fides visui quam ex remotioribus, concludit illud
quod apparet ei certius ex hiis corporibus esse propinquius.
Et planum quod visui debili certior fit fides coloris fortis quam
debilis, licet modicum plus elongati.

[7.252] Idem error accidit etiam in temperantia visus, quo-
15 niam in longitudine magna propinquius iudicatur corpus cuius
color fortis quam cuius color debilis, licet non sit multum re-
motius.

[7.254] In situ errat visus debilitas. Si ab aliquanta longi-
tudine, licet temperata, declinetur corpus, et sit modica decli-
20 natio, ignorabitur cum plene comprehenditur longitudo.

[7.255] Et incertitudo longitudinis et situs errorem ingerit
quantitatis.

[7.256] In figura: Quia gibbus corporis modicus et multi-

72 particulares *corr. ex particularis a. m. E* 73 non *inter. P3* 74 error *inter. a. m. E/ nulla: nullus R; alter. in nullus a. m. C1/post eo add. tempore C1L3 (inter. L3; scr. et del. C1)/ad temperantiam (75): a temperantia Er* 2 invehit *corr. ex invenit a. m. C1* 4 ante si *add. accidit error C1/post si add. enim R/opponantur: apponatur Er* 5 post unum *add. sit R* 7 inter: ad *R/post aliqua add. corpora interiecta R/incertam: et certam Er/incertam faciet transp. R* 9 post ex *add. locis R* 11 ei *om. P1* 12 post fit *scr. et del. visus E/fides coloris transp. E/fortis mg. a. m. C1; inter. a. m. L3* 13 modicum: modum *P1; paulo R* 14 etiam: et *ErL3P1S/post visus add. visus EP3 (scr. et del. P3)* 15 in: a *C1EErL3P3R* 16 multum: motum *EP3; multo R/remotius (17) corr. ex remotus L3* 18 visus *mg. a. m. C1/post si add. enim R/ab mg. a. m. C1/post ab scr. et del. ab P3* 19 licet *corr. ex ab a. m. C1* 20 ignorabitur: ignorabiliter *P3/ante cum add. illa declinatione C1/post cum mg. non a. m. C1* 21 post longitudinis *add. quantitatis R/et²: etiam R/et situs om. Er; inter. L3/et²... errorem: errorem et situs EP3R/ingerit: ingerunt C1L3S* 22 quantitatis *om. R; corr. ex quantitas P1* 23 post figura *add. erit error C1/quia om. P1S/corporis om. R*

plex angulus latet debilitatem visus.

25 [7.257] Et si in corpore linea nigra fuerit, existimabitur
divisio vel fissura, et existimabitur unum continuum corpora
contigua, unde error in divisione, continuitate, numero.

[7.258] Eadem erroris causa strabo unum iudicat duo si
30 fuerit informitas in uno tantum oculo, quoniam tenebit res visa
diversitatem situs respectu duorum oculorum eius.

[7.259] Si autem in duobus oculis eius sit deformatio, cum
accidit eos moveri, forsitan accidet ei diversitas situs respectu
vise rei, et ita in uno pluralitas.

[7.261] In motu: Si quis sepius in circuitu volvatur, cum
35 quiescit putat quod parietes moveantur. Et est quoniam, moto
vidente, movetur interius vis visibilis. Et licet videns steterit,
non statim vis visibilis stabit, sed motus eius in videntis quiete
durabit, et ob hoc motus visarum rerum estimatio insurgit. Et
huiusmodi motus exemplum in troco videmus, quoniam diu
40 post manus moventis quietem volvitur trocus. Est etiam infir-
mitas in qua videntur patienti omnia volvi.

[7.264] In quiete: Quando corpus similium partium volvi-
tur revolutione pauca, visus debilis non percipit eius motum
quem quidem percipiet visus temperatus.

45 [7.265] Si autem multa sit revolutio, non percipitur etiam a
temperato. Si vero sit dissimilium partium corpus motum, ut
in rota, visus debilis comprehendet motum. Si autem festina
fuerit revolutio, occultabitur visui debili motus. Quoniam par-
tes rote non multum sunt dissimiles, non plene comprehende-
50 tur dissimilitudo in festinatione, et per dissimilitudinem par-
tium fit comprehensio motus earum.

24 angulus *corr. ex angula* P3/latet: latent R 26 fissura: fixura ErL3/existimabitur:
existimabuntur C1ErL3R/unum . . . contigua (27): corpora contigua . . . continuum R
27 contigua: continua P3; *corr. ex continua a. m. E/post* continuitate *add. et* C1
28 strabo *corr. ex stabo* P3 29 informitas: deformitas R/tenebit: habet R/visa *corr.*
ex visam L3 30 *post eius add. et ita in numero communi* C1 31 *in om. Er/oculis*
eius transp. C1L3 32 forsitan: forte P1/ei: eis C1ErL3R 33 vise rei *transp.*
C1EErL3P3R/*post rei add. vise C1Er/pluralitas: pluritas EP1P3/post pluralitas add.*
videbitur C1 34 *post quis add. enim R/in circuitu om. P1/circuitu: circuitum R/*
volvatur: volvitur R 36 movetur: moveatur Er/interius: intrinsecus R/*vis om. C1;*
inter. L3; corr. ex visus P3 37 statim: stabit C1L3/*vis: visus Er/stabit: statim C1L3/*
sed: licet L3; *corr. ex licet* C1 38 durabit *corr. ex dabit a. m. C1/post durabit scr. et del.*
quiete E/ob om. Er/visarum rerum transp. C1ErL3 39 huiusmodi: huius C1EErL3P3R
40 volvitur: volvatur ErL3 42 *post quiete add. erit error C1/post partium add. ut sunt*
quaedam rotae horologiorum R; scr. et del. partium P1/volvitur (43): revolvitur R
44 percipiet: perciperet R 47 rota: tota EP3/*post rota add. moletrinae tunc R/autem:*
tamen C1ErL3 48 *post fuerit add. rote C1EErL3P3R (inter. a. m. E)* 49 rote: tote
EP3/*non¹ om. R/sunt om. ErL3P1S; inter. a. m. E/sunt dissimiles transp. R* 50 dis-
similitudo: similitudo P1

[7.267-268] In asperitate et lenitate: Quia forsitan reputabitur modicum lene asperum, vel econtrario si inter formas asperi et lenis fuerit dissimilitudo.

55 [7.269] In raritate. Cum fuerit in corpore raro soliditas pauca, existimabitur a visu debili maior vera.

[7.270] In soliditate: Cum fuerit in corpore raro color fortis, aut post ipsum, et raritas non magna, putabit illud esse solidum.

60 [7.272] In umbra: Note parietis albi sub nigredine descendente super ipsum luce, apparent etiam huic visui umbre.

[7.273] Et si fuerint multum nigre, apparebunt foramina in quibus tenebre.

[7.275-276] In decore, deformitate, similitudine, et dissimilitudine [error accidit] per particulares decoris vel fedtatis et similitudinis causas visum latentes.

[7.278] Et est error in predictis omnibus ex sola debilitate visus.

[7.279] Iam diximus quomodo accidit error in sillogismo secundum unamquamque causarum erroris visus in qualibet partium que adquiruntur per sillogismum. Iam incessimus super quemlibet erroris modum, et cuiuslibet supposuimus
5 exemplum. Et licet in erroribus visus sit copiosa multitudo, tamen omnium ad modos dictos fiet reductio, et ad exempla ordinatim proposita. Et assignavimus errores secundum quod singuli eorum accidunt ab unica tantum causa.

[7.280] Et aliquando error infertur non ab una tantum sed
10 duabus causis vel pluribus. Verbi gratia, si moveatur aliquid a longitudine magna motu lento subito visum, videbitur immotum, et percipi posset motus ille in temperata longitudine visus

52 *post lenitate add. erit error C1/forsan: forte P1/reputabitur* (53): reputabit C1EErL3P3R
53 *post vel scr. et del. asperitate C1* 56 *vera: vero Er; videtur P1S; corr. ex enim a. m. C1* 57 *soliditate corr. ex solitate a. m. C1/cum: si R/color om. EP3* 58 *magna: maxima C1EL3P3R/putabit: putabis S* 60 *albi om. R/post albi add. vel EP3/nigredine: nigre C1EErL3P3R* 61 *etiam om. C1EErL3P3R/huic: hoc L3 (scr. et del.)* 64 *decore deformitate: deformitate et decore C1EL3P3R/ante similitudine add. et C1EL3P3R/et om. S* 65 *per: propter R; om. S/et om. C1ErL3R; inter. a. m. E* 66 *ante causas add. et dissimilitudinis C1R (mg. a. m. C1)/causas: causam S* 67 *est mg. a. m. C1* 1 *quomodo: quando EP3/accidit: accidat ErR; corr. ex accidunt S/error om. P3* 2 *qualibet: quemlibet L3; corr. ex quemlibet a. m. C1* 3 *per om. L3; inter. a. m. E/iam: et R* 4 *supposuimus: supponimus L3S; corr. ex supponimus a. m. C1E* 5 *sit copiosa transp. P1* 6 *tamen alter. in cum L3/et inter. a. m. C1/exempla: extra EL3P3* 7 *ordinatim alter. ex ordinati in ordinationis a. m. C1/et om. EP3R/ante errores add. que EP3 (inter. a. m. E); add. quoque R/post errores add. et C1* 9 *tantum inter. a. m. E/post sed add. a R* 10 *a: in P1S* 12 *posset corr. ex post L3/temperata . . . et (13): distantia temperata etiam celeri visu vel R/longitudine: longe P1; om. EP3*

instantia manente. Et etiam in longitudine temperata non occultaretur motus si temperatum esset inspectionis tempus.

15 [7.281] Provenit igitur error ex duabus intemperantiis quarum neutra per se sufficit.

[7.282] Trium aggregatio errorem efficit. Si a magna longitudine, sub debili luce, in modico tempore opponatur visui corporis diversorum colorum revolutio non cita, existimabitur

20 corpus stare.

[7.283] Et si ab eadem longitudine, sub eadem luce, tempore temperato adhibeatur intuitus, comprehendetur motus, qui similiter non latebit in temperata longitudine sub eadem luce et modico tempore. Et etiam percipi poterit in eadem

25 longitudine sub forti luce.

[7.286] Et generaliter ex omnibus erroribus visui accidentibus nec unus nec plures aggregati evadunt causas quas diximus. Quelibet autem rei vise forma ex eis que numeravimus est compacta, et cum visus non adquirat ex rebus visis nisi aliquas istarum, non accidet error in visu nisi in aliqua istarum. Et omnis error qui accidit in scientia est quoniam intellectus similia efficit que percipit cum eis que percepit in modo aliquo aut dissimilia.

[7.287] Et omnis error in particularibus erit aut in sensu, aut in scientia, aut in sillogismo, nec potest esse quin sit in aliquo istorum, aut duobus, aut ipsis tribus. Et quicumque error accidit in huiusmodi tribus non erit nisi per errorem visus in partibus.

[7.288] Et iam patuit quod error visus in partialibus non erit nisi per causas quas assignavimus, aut ex una earum tantum aut ex pluribus.

13 *post instantia scr. et del. m E/et: etiam S/in inter. L3/post in add. illa R/temperata: intemperata R* 14 *si corr. ex se C1/temperatum: intemperatum P1* 15 *duabus: duobus S* 17 *post trium add. causarum C1/efficit corr. ex efficit P3/si: sed Er* 18 *debili corr. ex debi a. m. S* 21 *tempore (22) . . . luce (24) mg. L3* 22 *temperato: intemperato P3; corr. ex intemperato E/comprehendetur: comprehenditur L3* 24 *post poterit add. motus C1* 27 *aggregati: congregati EP3R/quas corr. ex que P3* 28 *eis: ijs R/post que scr. et del. in E/numeravimus: enumeravimus R* 29 *visis corr. ex visus P3* 30 *istarum!: ista Er/accidet: accidit C1EL3P3R* 31 *omnis om. P1* 32 *ante similia scr. et del. silla P3/cum . . . modo mg. L3/percepit: percipit Er; corr. ex percipit a. m. E* 34 *particularibus: partialibus C1EL3P3; corr. ex partialibus a. m. C1/erit: est C1/sensu aut in (35) mg. P3* 35 *ante nec mg. et a. m. E/nec: non E/nec . . . tribus (36) om. P3* 36 *istorum mg. a. m. C1/et quicumque inter. P3/et . . . tribus (37) inter. a. m. S/et quicumque: si P3* 37 *nisi inter. a. m. E* 39 *quod error transp. C1* 40 *earum: illarum P1*